AD A091133

DDC FILE COPY

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER AD-A091 133	**2. GOVT ACCESSION NO.**	**3. RECIPIENT'S CATALOG NUMBER**
4. TITLE (and Subtitle) Phase I Inspection Report Keuka Lake Outlet Dam Oswego River Basin, Yates County, NY Inventory No. 390		**5. TYPE OF REPORT & PERIOD COVERED** Phase I Inspection Report National Dam Safety Program
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) George Koch		**8. CONTRACT OR GRANT NUMBER(s)** DACW-51-79-C-0001
9. PERFORMING ORGANIZATION NAME AND ADDRESS New York Department of Environmental Conservation 50 Wolf Road Albany, NY 12233		**10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS**
11. CONTROLLING OFFICE NAME AND ADDRESS New York State Department of Environmental Conservation 50 Wolf Road Albany, NY 12233		**12. REPORT DATE** 16 September 1980
		13. NUMBER OF PAGES
14. MONITORING AGENCY NAME & ADDRESS(If different from Controlling Office) Department of the Army 26 Federal Plaza New York District, CofE New York, NY 10287		**15. SECURITY CLASS. (of this report)** UNCLASSIFIED
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; Distribution unlimited.

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

"Original contains color plates: All DTIC reproductions will be in black and white"

THIS DOCUMENT IS BEST QUALITY PRACTICABLE. THE COPY FURNISHED TO DDC CONTAINED A SIGNIFICANT NUMBER OF PAGES WHICH DO NOT REPRODUCE LEGIBLY.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Dam Safety
National Dam Safety Program
Visual Inspection
Hydrology, Structural Stability

Keuka Lake
Yates County
Oswego River

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report provides information and analysis on the physical condition of the dam as of the report date. Information and analysis are based on visual inspection of the dam by the performing organization.

Examination of available documents and a visual inspection of the dam did not reveal conditions which constitute an immediate hazard to human life or property.

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE

393970

Best Available Copy

Several deficiencies were noted and these should be corrected within 6 months of the date of the final approval of this report. Among the other actions which should be taken are repairing concrete on the post supporting the northern slide gate, filling the small scoured areas behind the sheet pile wall and monitoring the leakage through the masonry wall. In addition, a detailed emergency operation-action plan and warning system should be developed.

The spillways do not have sufficient capacity to discharge the peak outflow from one-half the Probable Maximum Flood (PMF). For this storm event and lesser events, high discharges will cause damage in the channel downstream of the dam. However, dam failure would not significantly increase the hazard to loss of life downstream from that which would exist just prior to an overtopping-induced failure. Therefore, the spillway is assessed as inadequate.
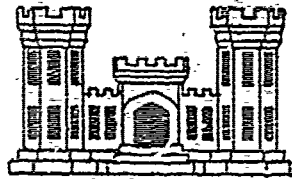
OSWEGO RIVER BASIN

KEUKA LAKE OUTLET DAM

YATES COUNTY, NEW YORK
INVENTORY NO. N.Y. 390

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

NEW YORK DISTRICT CORPS OF ENGINEERS

AUGUST 1980

CONTRACT NO. DACW-51-78-C0001

80 10 29 008

DISCLAIMER NOTICE

THIS DOCUMENT IS BEST QUALITY PRACTICABLE. THE COPY FURNISHED TO DTIC CONTAINED A SIGNIFICANT NUMBER OF PAGES WHICH DO NOT REPRODUCE LEGIBLY.

PREFACE

This report is prepared under guidance contained in the
Recommended Guidelines for Safety Inspection of Dams, for Phase I
Investigations. Copies of these guidelines may be obtained from
the Office of Chief of Engineers, Washington, D.C. 20314. The
purpose of a Phase I Investigation is to identify expeditiously
those dams which may pose hazards to human life or property. The
assessment of the general condition of the dam is based upon available
data and visual inspections. Detailed investigation, and analyses
involving topographic mapping, subsurface investigations, testing,
and detailed computational evaluations are beyond the scope of a
Phase I Investigation; however, the investigation is intended to
identify any need for such studies.

In reviewing this report, it should be realized that the reported
condition of the dam is based on observations of field conditions
at the time of inspection along with data available to the inspection
team. In cases where the reservoir was lowered or drained prior to
inspection, such action, while improving the stability and safety of
the dam, removes the normal load on the structure and may obscure
certain conditions which might otherwise be detectable if inspected
under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on
numerous and constantly changing internal and external conditions,
and is evolutionary in nature. It would be incorrect to assume that
the present condition of the dam will continue to represent the
condition of the dam at some point in the future. Only through frequent
inspections can unsafe conditions be detected and only through continued
care and maintenance can these conditions be prevented or corrected.

Phase I inspections are not intended to provide detailed hydrologic
and hydraulic analyses. In accordance with the established Guidelines,
the Spillway Test flood is based on the estimated "Probable Maximum
Flood" for the region (greatest reasonably possible storm runoff), or
fractions thereof. Because of the magnitude and rarity of such a storm
event, a finding that a spillway will not pass the test flood should
not be interpreted as necessarily posing a highly inadequate condition.
The test flood provides a measure of relative spillway capacity and
serves as an aide in determining the need for more detailed hydrologic
and hydraulic studies, considering the size of the dam, its general
condition and the downstream damage potential.

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
KEUKA LAKE OUTLET DAM
I.D. NO. NY 390
OSWEGO RIVER BASIN
YATES COUNTY, NEW YORK

TABLE OF CONTENTS

APPENDIX

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam: Keuka Lake Outlet Dam (I.D. No. NY 390)

State Located: New York

County Located: Yates

Watershed: Oswego River Basin

Date of Inspection: May 8, 1980

ASSESSMENT

Examination of available documents and a visual inspection of the dam
did not reveal conditions which constitute an immediate hazard to human
life or property.

Several deficiencies were noted and these should be corrected within 6
months of the date of the final approval of this report. Among the other
actions which should be taken are repairing concrete on the post supporting
the northern slide gate, filling the small scoured areas behind the sheet
pile wall and monitoring the leakage through the masonry wall. In addition,
a detailed emergency operation-action plan and warning system should be
developed.

The spillways do not have sufficient capacity to discharge the peak
outflow from one-half the Probable Maximum Flood (PMF). For this storm event
and lesser events, high discharges will cause damage in the channel downstream
of the dam. However, dam failure would not significantly increase the hazard
to loss of life downstream from that which would exist just prior to an
overtopping-induced failure. Therefore, the spillway is assessed as inadequate.

George Koch
Chief, Dam Safety Section
New York State Department
  of Environmental Conservation
NY License No. 45937

Approved By:

Col. W. H. Smith Jr.
New York District Engineer

Date:

OVERVIEW
KEUKA LAKE OUTLET DAM
I.D. NO. NY 390

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
KEUKA LAKE OUTLET DAM
I.D. NO. NY 390
#53B-673
OSWEGO RIVER BASIN
YATES COUNTY, NEW YORK

SECTION 1: PROJECT INFORMATION

1.1 GENERAL

a. Authority
The Phase I inspection reported herein was authorized by the Department
of the Army, New York District, Corps of Engineers, to fulfill the
requirements of the National Dam Inspection Act, Public Law 92-367.

b. Purpose of Inspection
This inspection was conducted to evaluate the existing condition of the dam, to
identify deficiencies and hazardous conditions, to determine if these
deficiencies constitute hazards to life and property and to recommend
remedial measures where required

1.2 DESCRIPTION OF PROJECT

a. Description of Dam
The Keuka Lake Outlet Dam is a concrete, masonry and earth structure with
gated spillways at either '' of the structure and an auxiliary spillway
in the center.

The dam is approximately 100 eet long and a maximum of 10.5 feet high.
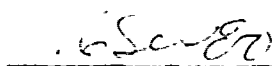At the south end of the structure there are two Rodney Hunt sluice gates
54 inches by 54 inches. The invert of the orifice for these gates is low
enough to permit them to be used to partially drain the reservoir. The
control mechanism for these gates is located on the top of the dam.
Steel sheet pile walls form the entrance channel to this spillway. There
is a vertical slide gate controlling flow through an opening which is 4
feet wide by 5.4 feet high on the northern end of the dam. This gate is
referred to on the plans as the Birkett Gate. In the center of the dam
there is an auxiliary spillway which is 50.8 feet wide. This spillway
consists of an earth fill on the upstream slope and a vertical masonry
wall with a concrete cap forming the crest.

b. Location
The dam is located in the Village of Penn Yan on the Keuka Lake Outlet.
New York State Route 14A (which is also Main Street in the village) is
immediately downstream of the dam.

c. Size Classification
The dam is 10.5 feet high and has a maximum storage capacity of 200,750
acre-feet. Therefore, the dam is in the large size category as defined
by the "Recommended Guidelines for Safety Inspection of Dams."

d. Hazard Classification

The dam is classified as a "high" hazard structure, due to the presence of 6 homes, a sewage treatment plant, an industrial plant and several local roads located downstream of the dam.

e. Ownership

The dam is owned by the Village of Penn Yan. Mr. Wesley Ryder is the Utilities Manager for the village. He may be contacted at the village offices at 2 Maiden Lane, Penn Yan. The phone number for the offices is (315)536-3374.

f. Purpose of Dam

The dam is used to regulate the level of Keuka Lake. The gates are operated in a manner to provide some flood control regulation.

g. Design and Construction History

Records indicate that this dam was constructed in or about 1880 by the State for use as a canal lock. In 1900, it was renovated and converted to a power dam. New York State Electric and Gas Corporation controlled the dam until 1962, when it was turned over to the Village. The gates on the south end of the dam, were replaced in 1966. Owen C. Hoban, consulting engineer, designed the reconstruction of this portion of the dam. At that time, the two Rodney Hunt Gates currently in existence were installed.

h. Normal Operational Procedures

The water surface in Keuka Lake is maintained according to an established plan. The graph which details the suggested lake level for each month of the year has been included in Appendix C. The water level is changed through the operation of the two Rodney Hunt Gates at the southern end of the dam. The Village of Penn Yan is responsible for the operation of the gates.

1.3 PERTINENT DATA

a. Drainage Area   (square miles) 182

b. Discharge at Dam

		COMPUTED DISCHARGE (cfs)		
STAGE	RODNEY HUNT (GATES-2)*	BIRKETT GATE*	CENTER MASONRY SPILLWAY	TOTAL
708.43	-			-
709	10.8	-		10.8
714	328	12.4		452
716.04	524	193	-	717
718.75	646	227	715	1588

* Gates Fully Open

c. Elevations (USGS Datum)
   Top of Dam   718.75
   Auxiliary Spillway Crest   716.04
   Normal Pool   712-714
   Sill of Birkett (Northern) Gate   709.0
   Sill of Rodney Hunt (Southern) Gate   708.43

d. Reservoir-Surface Area   (sq. miles)
   Normal Pool   18.3

e. Storage Capacity   (Acre-Feet)
   Top-of-Dam   200,750
   Auxiliary Spillway Crest   166,000
   Sill of Birkett Gate   86,500
   Sill of Rodney Hunt Gate   80,500

f. Dam
   Type: Earth fill upstream slope, masonry and concrete dam

   Dam length(ft):   100
   Crest Width(ft):   5

g. Service Spillways
   Northern End-Birkett Gate
   Type: Single slide gate with an opening 4 feet wide by 5.4 feet high

   Invert Elev.   709.0

   Southern End - Twin Gates
   Type: Two Rodney Hunt gates; each opening 4.5 feet by 4.5 feet
          Control mechanism located above gates.

   Invert Elev.   708.43

h. Auxiliary Spillway
   Weir in center of dam with earth fill on upstream slope and vertical
   masonry wall with concrete cap forming crest.

   Length(ft):   50.8

SECTION 2: ENGINEERING DATA

2.1 GEOTECHNICAL DATA

a. Geology

The Keuka Lake Outlet Dam is located in the glaciated Alleghany plateau physiographic province of New York State. The rock in this area consists of limestones, dolomites, shales and sandstones from the Devonian era. The rock lies almost horizontal although there is some sagging in the middle of the Finger Lakes district. Severe trenching or dissection by streams and glacial erosion has carved the upland into very rugged terrain. A review of the "Brittle Structures Map of the State of New York" indicated that there are no faults in the immediate vicinity of the dam.

The surficial soils are the result of glaciations during the Cenozoic Era, the last of which was the Wisconsin glaciation.

b. Subsurface Investigations

No records of any subsurface investigations made in the vicinity of this structure could be located.

2.2 DESIGN RECORDS

No records concerning the original design of this dam were available. Plans prepared in 1955 by Owen C. Hoban, consulting engineer, for the reconstruction of the southern end of the dam and the installation of the Rodney Hunt gates were available. Copies of these plans have been included in Appendix E.

2.3 CONSTRUCTION RECORDS

There were no construction records available.

2.4 EVALUATION OF DATA

The data presented in this report was obtained from the Department of Environmental Conservation files, from Wesley Ryder, utilities manager for the Village of Penn Yan, and from measurements made during the site inspection. While the data available concerning the central and northern end of the dam was somewhat limited, overall the information appeared to be adequate and reliable for Phase I inspection purposes.

SECTION 3: VISUAL INSPECTION

3.1 FINDINGS

a. General

Visual inspection of the Keuka Lake Outlet Dam was conducted on
May 8, 1980. The weather was overcast and the temperature was
around 50 degrees. At the time of the inspection, the lake level
was at elevation 714.

b. Dam

No serious deficiencies were noted on this structure. The embankment
portion forming the upstream slope was in satisfactory condition. The
masonry and concrete wall which formed the crest of the auxiliary spillway
was also in satisfactory condition. An inspection report from 1977
(a copy of which has been included in Appendix D) indicated that there
was a small amount of leakage exiting from the base of the masonry wall.
This area could not be observed at the time of this inspection due to the
tailwater level. Mr. Ryder, the village Utilities Manager, indicated
that this leakage has been occuring for a number of years, with no
noticeable increase in quantity.

c. Service Spillways

The two Rodney Hunt gates on the southern end of the dam had been greased
recently and were operable. At the time of the inspection, the gates
were opened and there was some debris caught in the opening. There was
some scour behind the ends of the sheet pile walls on either side of the
southern spillway channel.

The slide gate on the northern end was very old but appeared to be
operational. The gate control mechanism was supported on four concrete
posts at its corners. The concrete on the left front post was deteriorated
and partially removed. Further loss of concrete on this post could result
in the gate becoming inoperable. The northern bank of the approach channel
to this spillway is lined with gabions and riprap. This bank appeared to
be in satisfactory condition.

d. Auxiliary Spillway

The auxiliary spillway is formed by the center portion of the dam. It
appeared to be in satisfactory condition.

e. Reservoir

There were no indications of soil or channel instability in the immediate
vicinity of the dam. The channel which leads from the end of the lake to
the dam is relatively narrow and its capacity is further limited by a
railroad bridge located approximately 500 feet upstream of the dam. This
bridge traps a substantial amount of debris.before it reaches the dam.
Some trees and brush line the channel banks in the area between this
railroad bridge and the dam. These banks should be cleared to reduce the
amount of debris which flows to the dam.

f. Downstream Channel

The Main Street Bridge is located immediately downstream of the dam.
Beyond the bridge, there are several mill buildings which are located
at the edge of the channel.

3.2 EVALUATION OF OBSERVATIONS

Visual inspection revealed several deficiencies on this structure. The following items were noted:

1. Deterioration and partial removal of concrete on post supporting northern slide gate control mechanism.

2. Minor scour behind the sheet pile walls on either side of the southern spillway channel.

3. Debris accumulated in the vicinity of the northern spillway gates.

4. Trees and brush lining the channel upstream of the dam.

5. A small amount of leakage from the base of the masonry wall (observed during a 1977 inspection).

SECTION 4: OPERATION AND MAINTENANCE PROCEDURE

4.1 PROCEDURES

The water surface in this lake is maintained according to the plan which has been included in Appendix C. The water level is controlled by the operation of the two Rodney Hunt gates. A minimum outflow of approximately 20 cfs is maintained to provide flow in the downstream channel. To permit this minimum flow, the gates are kept open about 6 inches.

4.2 MAINTENANCE OF DAM

Routine maintenance of the dam is performed by the Village of Penn Yan.

4.3 WARNING SYSTEM IN EFFECT

No apparent warning system is present.

4.4 EVALUATION

The operation and maintenance procedures for this dam appear to be satisfactory. A detailed emergency operation action plan and warning system should be developed.

SECTION 5: HYDROLOGIC/HYDRAULIC

5.1 DRAINAGE AREA CHARACTERISTICS

The delineation of the contributing watershed to this dam is shown on the map titled "Drainage Area Map - Keuka Lake Outlet Dam" (Appendix C). The relationship of the Keuka Lake watershed to the entire Oswego River Basin is indicated on the map (Appendix C) titled "Oswego River Basin - Basin Map." The irregular but somewhat rectangular shaped, north-south oriented watershed of some 182 square miles drains from the surrounding landscape directly into the Y-shaped, 20 mile long Keuka Lake. Numerous short, steep tributaries surrounded the lake with the larger tributaries; i.e., Sugar Creek, Glen Brook, Mitchellsville Creek, Softwater Creek, and Cold Brook which becomes Keuka Inlet, located within the west and southwest portions of the watershed. Keuka Lake itself has a surface area of some 18.3 square miles and a shoreline length of 55 miles. The surrounding terrain rises steeply to the hilltops which are at elevations 400 to 1200 feet above the Lake. Land use within the watershed is predominantly agricultural with large areas devoted to vineyards. Developed areas are located at Penn Yan, Keuka Park, Hammondsport, Branchport, and Pulteney. Additional runoff is diverted at times directly into Keuka Lake at a New York State Electric and Gas Corporation (NYSE&G) power station located at Keuka. This runoff occurs from a 45.5 square mile catchment area surrounding Waneta and Lamoka Lakes which lie within the Susquehanna River Basin. This diversion consists of a diversion canal 9000 feet long plus a 4400 feet long pipeline. The average diversion inflow rate is about 80 cfs or 158 acre-feet per day.

5.2 ANALYSIS CRITERIA

No hydrologic/hydraulic information was available regarding the original design for this dam. The 1960 Corps of Engineers report (Ref. 6) provided information regarding stage-storage data for Keuka Lake, and stage-discharge curves for the existing Birkett gate and the center masonry spillway.. The stage-discharge curve calculated for the newer Rodney Hunt gates assumed fully open gates using both weir and orifice flow conditions for increasing water surface elevations.

The analysis of the spillway capacity of the dam was performed using the Corps of Engineers HEC-1 computer program, Dam Safety version. The computer modeling parameters for the drainage area were selected from the Oswego River Basin study (Ref. 7). The spillway design flood selected was the Probable Maximum Flood (PMF) in accordance with the Recommended Guidelines of the Corps of Engineers. The PMF storm event is that hypothetical flow resulting from the most critical combination of rainfall, minimum soil infiltration loss, and concentration of runoff at a specific location that is considered reasonably possible for a specific watershed.

5.3 SPILLWAY CAPACITY

The two Rodney Hunt gates, each 4.5 feet square, are the primary control structures and were analyzed for both weir and orifice flow conditions in the fully open position. The discharge coefficients, C, for weir and orifice flow respectively were 2.77 and 0.7.

Additional normal discharge capacity at the site is obtained from the
Birkett gate which was also analyzed in a similar manner. This gate
is normally positioned at a fixed opening; for the analysis, a fully
open gate was used. Discharge coefficients of 2.77 and 0.42 respectively
were determined using the existing stage-discharge curves. The center,
masonry auxiliary spillway's discharge capacity was also obtained from
the existing stage-discharge curve, developed using a weir coefficient
of 3.1. Although there exists a 13 foot wide railroad underpass 55 feet
right of the Rodney Hunt gates, any additional discharge capacity through
this area was not considered.

Computed discharges for all site facilities are as follows (all gates
fully open):

ELEV. (USGS)		DISCHARGE (cfs)
718.75	Top of Dam	1588
716.04	Auxiliary Spillway	717
	Crest	

The flood analyses performed for this dam considered two conditions:
the gates fully closed and fully open. From an initial water surface
elevation of 714 (mid-summer stage), the spillways when fully open
do not have sufficient capacity for discharging the peak outflow from
one-half the PMF. For this storm event, the peak inflow is 51,947 cfs
and the peak outflow is 2,884 cfs.

5.4 RESERVOIR CAPACITY

Normal lake levels fluctuate throughout the year between the elevations
of 712 and 715. The available storage capacity for these elevations is
35,000 acre-feet which is equivalent to 3.6 inches of direct runoff from
the watershed. Storage capacity to elevation 716 adds some 12,000 acre-
feet (1.2 inches). Surcharge storage capacity to the top-of-dam elevation
of 718.75 adds an additional 34,750 acre-feet (3.58 inches). The total
storage capacity of Keuka Lake is 200,750 acre-feet for elevation 718.75.
Since the dam is located approximately one mile downstream of the main
body of Keuka Lake, stages recorded at the dam do not indicate corresponding
lake levels. Gage readings have established the head losses along the
outflow channel leading to the dam as being about 0.5 feet.

5.5 FLOODS OF RECORD

The maximum known flood in the watershed occurred on June 24, 1972 when a
gage reading of 719.35 was recorded at Hammondsport. The watershed total
precipitation during this 5 day event ranged from 8 to 10 inches of rain.
In 1872, a higher lake level of 720.09 was recorded but the present structure
did not exist as it does today for this storm event.

5.6 OVERTOPPING POTENTIAL

Records indicate that the present dam has been overtopped by approximately
0.5 feet during the maximum flood. No dam failure has been recorded. The
analyses indicates the spillways do not have sufficient discharge capacity
for one-half the PMF. The computed depth of overtopping is 1.84 feet for

this event. Overtopping would occur for all storm events exceeding 32% of the PMF.

5.7 EVALUATION

The spillway capacity is inadequate for the peak outflow from one-half the PMF. The Corps of Engineers report (Ref. 6) indicates discharges in excess of 500 cfs will cause damage in the channel downstream of the dam. Hence, dam failure would not significantly increase the hazard to loss of life downstream from that which would exist just prior to an overtopping-induced failure. Therefore, the spillway is assessed as inadequate.

SECTION 6: STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations
Visual observations of the dam did not reveal any serious deficiencies which would affect the stability of the dam. There was a small amount of scour behind the upstream ends of the sheet piling and one of the concrete posts supporting the gate mechanism at the northern end of the dam was deteriorated. A small amount of leakage exiting at the base of the masonry wall was observed in a prior inspection. With the exception of these deficiencies, the dam appeared to be structurally in good condition

b. Design and Construction Data
Design and construction data was very limited. Plans for the southern portion of the dam which was reconstructed in 1966 were available and have been included in Appendix E. No accurate cross sections of the Birket Gate section or the auxiliary spillway section could be located. Due to this lack of cross sectional data, and due to the unique composition of this structure, no stability analysis was performed. However, there was no evidence of any stability problems on this structure.

SECTION 7: ASSESSMENT/RECOMMENDATION

7.1 ASSESSMENT

a. Safety

The Phase I inspection of the Keuka Lake Outlet Dam did not reveal conditions which constitute a hazard to human life or property. Minor deficiencies such as the deterioration of concrete on the northern slide gate control mechanism and the leakage exiting at the base of the wall could affect the safety of the dam if the conditions worsen.

The spillways, while not having sufficient discharge capacity for passing one-half the PMF, are considered to be inadequate. During periods of unusually heavy precipitation and high runoff occurring over the watershed, continuous surveillance should be provided both at the dam and in the downstream areas to warn residents of high floodwater conditions. Such surveillance procedures and other measures deemed necessary should be developed, documented and placed in readiness for future use as part of a detailed emergency operation-action plan. A warning system should also be developed and implemented; to be used in the event of dam failure.

b. Adequacy of Information

The information available for the preparation of this report was considered to be adequate for Phase I inspection purposes.

c. Urgency

The remedial measures outlined in the following section should be taken within 6 months of the date of final approval of this report.

7.2 RECOMMENDED MEASURES

1. Repair the concrete on the post supporting the northern slide gate control mechanism.

2. Fill the small scoured areas behind the sheet pile walls and protect this area with riprap.

3. Monitor the leakage in the masonry wall and if it becomes worse, take remedial actions.

4. Remove the debris which has accumulated in the vicinity of the northern spillway gates.

5. Cut trees and brush which line the channel in the vicinity of the dam.

6. Develop and implement a detailed emergency operation-action plan and warning system.

APPENDIX A

PHOTOGRAPHS
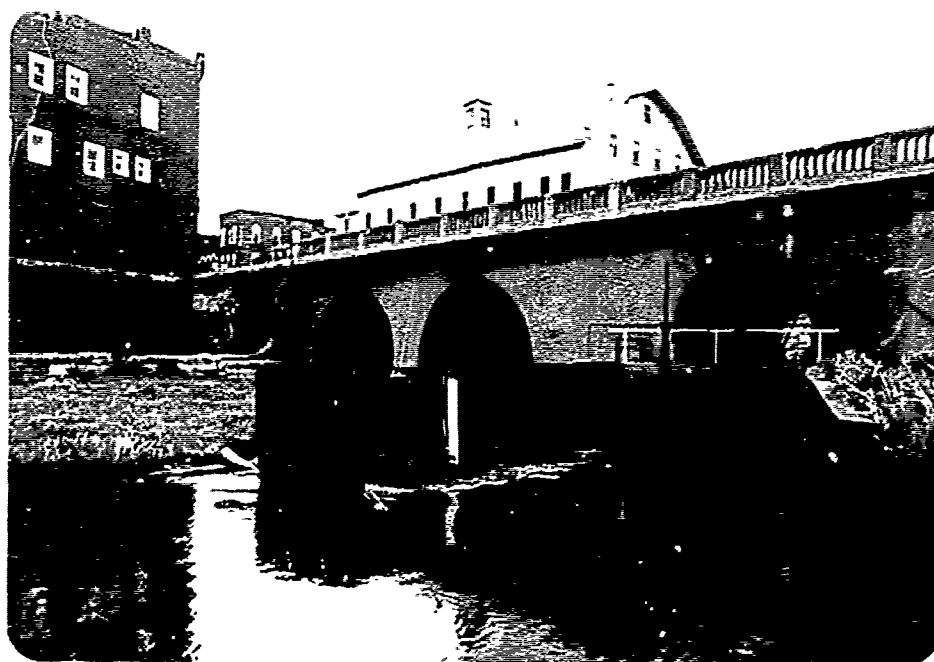
Entrance Channel to Southern Service Spillway
Note Erosion Behind End of Sheet Piling

Entrance Channel Looking Upstream-Note trees
Hanging Over Approach Channel
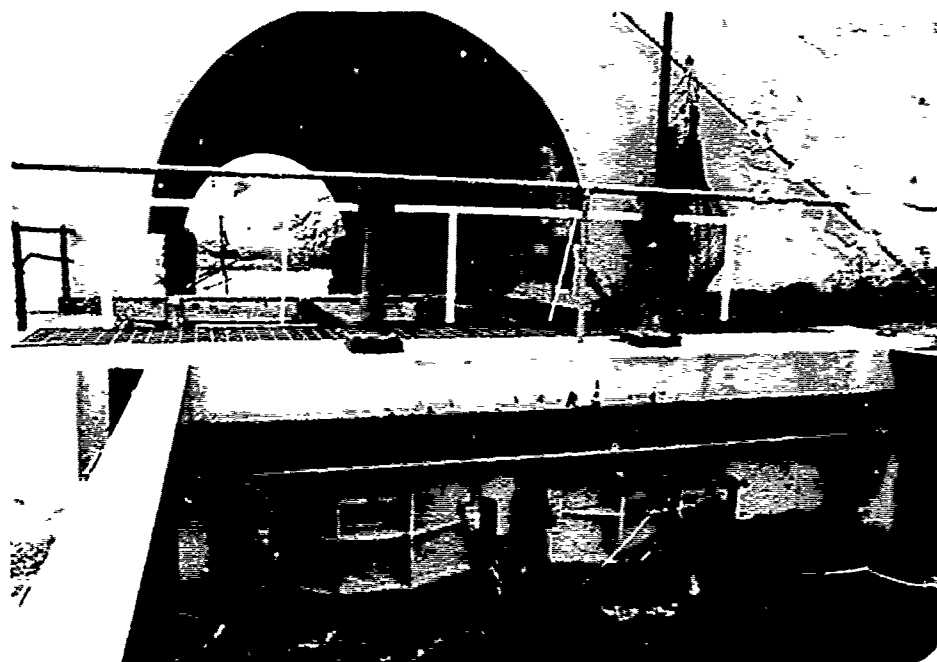
Southern Service Spillway-Rodney Hunt Gates

Southern Service Spillway-Looking Upstream
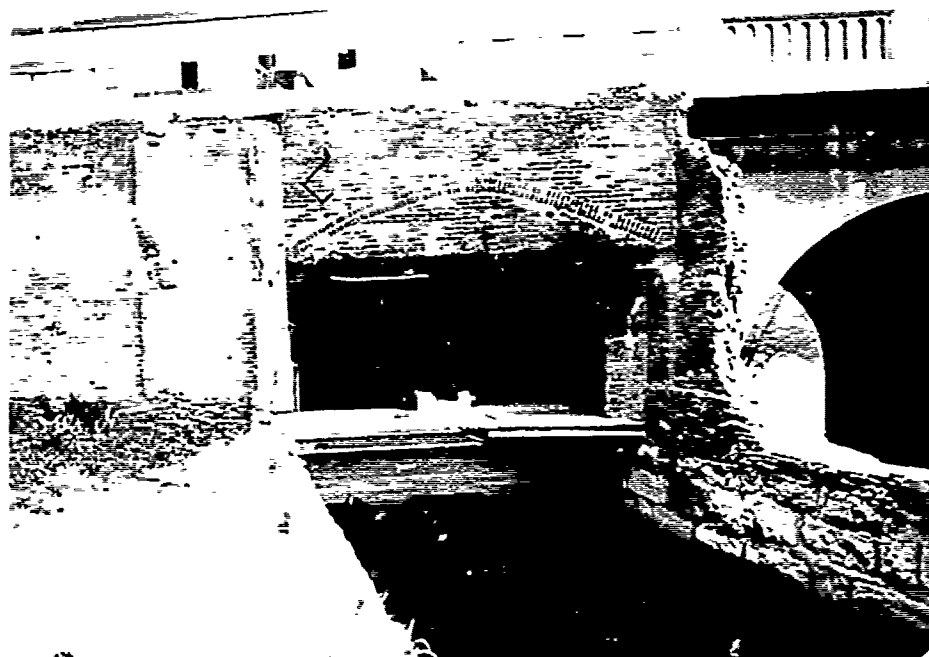
Northern Service Spillway-Birkett Gate

Channel Downstream of Birkett Gate
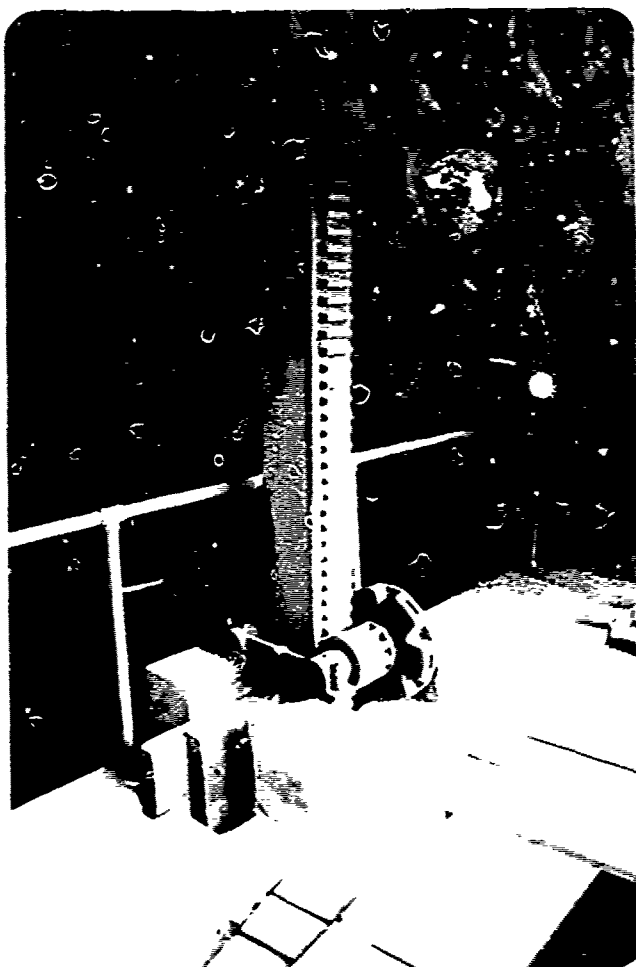
Control Mechanism For Birkett Gate
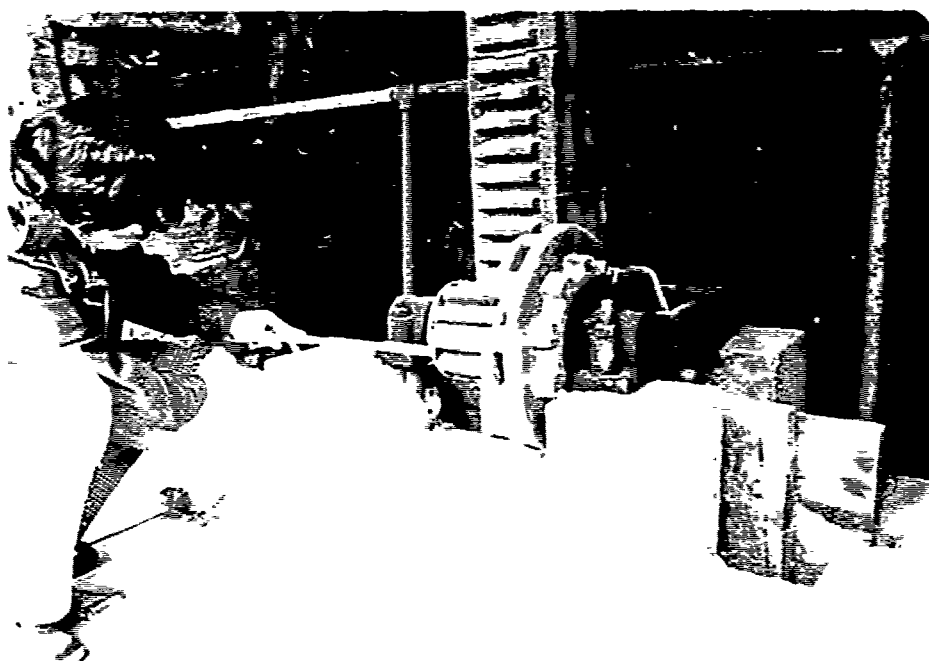
Deteriorated Concrete on One of Support Posts for Birkett Gate

Auxiliary Spillway Channel with Earth Fill on Upstream Slope
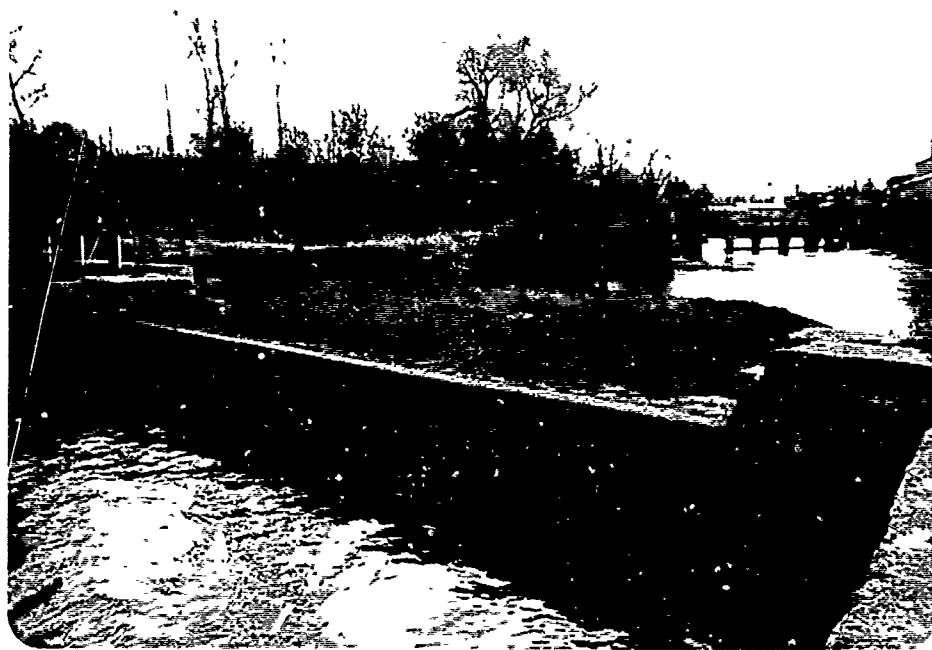
Masonry Wall on Auxiliary Spillway-Slight
Leakage Reported at Base of Wall

Northern Wall of Approach Channel
Note Gabions and Riprap

Railroad Bridge Upstream of Dam which
Restricts Flow

APPENDIX B

VISUAL INSPECTION CHECKLIST

VISUAL INSPECTION CHECKLIST

1) Basic Data

   a. General

      Name of Dam KEUKA LAKE OUTLET DAM

      Fed. I.D. # NY-390   DEC Dam No. 53B-613

      River Basin OSWEGO

      Location: Town PENN YAN   County YATES

      Stream Name KEUKA LAKE OUTLET

      Tributary of _____

      Latitude (N) 42° 39.6′   Longitude (W) 77° 3.2′

      Type of Dam CONCRETE, MASONRY & EARTH FILL

      Hazard Category C

      Date(s) of Inspection 5/8/80

      Weather Conditions OVERCAST 50°F

      Reservoir Level at Time of Inspection 714

   b. Inspection Personnel W. LYNICK   R. WARRENDER

   c. Persons Contacted (Including Address & Phone No.) _____

      WESLEY RYDER - UTILITIES MANAGER - VILLAGE OF PENN YAN

        315-536-3374

   d. History:

      Date Constructed 1900   Date(s) Reconstructed 1962

      Designer _____ C. HOBAN

      Constructed By _____

      Owner VILLAGE OF PENN YAN

2) <u>Embankment</u>

   a. Characteristics

      (1) Embankment Material ___EARTH & ROCK FILL___

      (2) Cutoff Type _____

      (3) Impervious Core _____

      (4) Internal Drainage System _____

      (5) Miscellaneous _____

   b. Crest   NOT APPLICABLE

      (1) Vertical Alignment _____

      (2) Horizontal Alignment _____

      (3) Surface Cracks _____

      (4) Miscellaneous _____

   c. Upstream Slope

      (1) Slope (Estimate) (V:H) ___FLAT___

      (2) Undesirable Growth or Debris, Animal Burrows ___NONE___

      (3) Sloughing, Subsidence or Depressions ___No___

(4) Slope Protection _BANK RETAINER STONE WALL AT_
UPSTREAM TOE

(5) Surface Cracks or Movement at Toe _NONE_

d. Downstream Slope

(1) Slope (Estimate - V:H) _NOT APPLICABLE_

(2) Undesirable Growth or Debris, Animal Burrows _____

(3) Sloughing, Subsidence or Depressions _____

(4) Surface Cracks or Movement at Toe _____

(5) Seepage _____

(6) External Drainage System (Ditches, Trenches; Blanket) _____

(7) Condition Around Outlet Structure _____

(8) Seepage Beyond Toe _____

e. Abutments - Embankment Contact

SATISFACTORY

        (1)   Erosion at Contact _____

_____

        (2)   Seepage Along Contact _____

_____

_____

_____

3) Drainage System

    a. Description of System _None_ _____

_____

_____

_____

    b. Condition of System _____

_____

    c. Discharge from Drainage System _____

_____

_____

4) Instrumentation (Momumentation/Surveys, Observation Wells, Weirs, Piezometers, Etc.)_____

    STAFF GAGE ON UPSTREAM SHEET PILE IN FRONT

    OF SERVICE SPILLWAY GATES _____

_____

_____

_____

_____

_____

5) Reservoir

   a. Slopes KEUKA LAKE & OUTLET CHANNEL - BRUSH & TREES GROWING ALONG CHANNEL SHOULD BE CUT TO REDUCE DEBRIS PROBLEM

   b. Sedimentation _____

   c. Unusual Conditions Which Affect Dam NARROW CHANNEL TO DAM RAILROAD BRIDGE UPSTREAM COLLECTS DEBRIS & PONDS SOME H_2O.

6) Area Downstream of Dam

   a. Downstream Hazard (No. of Homes, Highways, etc.) 6 HOMES; SEWAGE TREATMENT PLANT; SEVERAL LOCAL ROADS; INDUSTRIAL PLANT JUST BEYOND LEFT ABUTMENT

   b. Seepage, Unusual Growth NONE

   c. Evidence of Movement Beyond Toe of Dam NO

   d. Condition of Downstream Channel SATISFACTORY

7) Spillway(s) (Including Discharge Conveyance Channel)

2 GATES ON SOUTHERN ~~EASTERN~~ END; 1 SLIDE GATE ON NORTHERN END; AUXILIARY CHANNEL IN MIDDLE - GRASS SLOPE CONCRETE OVER MASONRY WALL

   a. General _____

SOUTHERN GATES INSTALLED IN 1966- 2 RODNEY HUNT GATE VALVES - SOME SCOUR IN BACK OF SHEET PILING ON UPSTREAM END

   b. Condition of Service Spillway NORTHERN END GATE - CONCRETE SPALLED AND REMOVED UNDER 1 CORNER OF SUPPORT. FURTHER REMOVAL WOULD MAKE GATE INOPERABLE

SOUTHERN END GATES - LIFT GATE MECHANISM WAS RECENTLY GREASED & IS OPERABLE - SOME DEBRIS CAUGHT IN OPENING

c. Condition of Auxiliary Spillway _GooD_____

_____

_____

_____

_____

d. Condition of Discharge Conveyance Channel _____

__4 ARCHES UNDER MAIN STREET BRIDGE - COULD LIMIT__

__FLOW SOME WHAT_____

_____

_____

8) <u>Reservoir Drain/Outlet</u> _NONE - ALTHOUGH SERVICE SPILLWAY_
                          CAN BE USED TO LOWER WATER LEVEL

Type: Pipe _____ Conduit _____ Other _____

Material: Concrete _____ Metal _____ Other _____

Size: _____ Length _____

Invert Elevations: Entrance _____ Exit _____

Physical Condition (Describe):   Unobservable _____

Material: _____

Joints: _____ Alignment _____

Structural Integrity: _____

_____

Hydraulic Capability: _____

_____

Means of Control: Gate _____ Valve _____ Uncontrolled _____

Operation: Operable _____ Inoperable _____ Other _____

Present Condition (Describe): _____

_____

9) <u>Structural</u>

    a. Concrete Surfaces *BIRKETT GATE - FRONT GATE LIFT SUPPORT BLOCKS CRACKED & BROKEN*

    RODNEY HUNT ~~ARMORING~~ GATE - CONCRETE IS GOOD

    b. Structural Cracking *NONE · MASONRY SURFACES ALL SATISFACTORY*

    c. Movement - Horizontal & Vertical Alignment (Settlement) *OKAY*

    d. Junctions with Abutments or Embankments. *SATISFACTORY*

    e. Drains - Foundation, Joint $_x$ Face *NONE*

    f. Water Passages, Conduits, Sluices *SATISFACTORY*

    g. Seepage or Leakage *BACKWATER PREVENTED OBSERVATION*

h. Joints - Construction, etc. _____

_____

_____

_____

i. Foundation _____

_____

_____

_____

j. Abutments _____

_____

k. Control Gates _GATE IN SATISFACTORY CONDITION EXCEPT CONCRETE_
DETERIORATED ON ONE POST OF BIRKETT (NORTHERN) GATE

l. Approach & Outlet Channels _NORTHERN WALL: GABIONS AND_
RIP RAP - GOOD CONDITION

_____

_____

m. Energy Dissipators (Plunge Pool, etc.) _NONE_

_____

_____

n. Intake Structures _____

_____

_____

_____

o. Stability _APPEARS TO BE SATISFACTORY_

_____

p. Miscellaneous _____

_____

_____

<u>APPENDIX C</u>

<u>HYDROLOGIC/HYDRAULIC</u>
<u>ENGINEERING DATA AND COMPUTATIONS</u>

CHECK LIST FOR DAMS   KEUKA
HYDROLOGIC AND HYDRAULIC   LAKE
ENGINEERING DATA

NY - 390   1

AREA-CAPACITY DATA: (USGS)

		Elevation (ft.)	Surface Area (acres)	Storage Capacity (acre-ft.)
1)	Top of Dam	718.75		200,750
2)	Design High Water (Max. Design Pool)	N/A		
3)	Auxiliary Spillway Crest	716.04		166,000
4)	Pool Level with Flashboards	N/A		
5)	Service Spillway Crest (INVERTS)	RODNEY HUNT – 708.43		80,500
		BIRKETT – 709		86,500

DISCHARGES

		Volume (cfs)
1)	Average Daily	N/A
2)	Spillways @ Maximum High Water	1588
3)	Spillway @ Design High Water	N/A
4)	Spillways @ Auxiliary Spillway Crest Elevation	717
5)	Low Level Outlet	N/A
6)	Total (of all facilities) @ Maximum High Water	1588
7)	Maximum Known Flood (ELEV. 719.35 ON LAKE ± 718.85 @ DAM	1600 ±
8)	At Time of Inspection [EL = 714.18 ±]	478 ±

CREST: ELEVATION: <u>718.75</u>

    Type: <u>CONCRETE & MASONRY</u>

    Width: <u>5'</u> Length: <u>~~85'~~ ±100'</u>

    Spillover <u>GATES</u> { BIRKETT / RODNEY HUNT (2) <u>AUXILIARY CHANNEL</u>

    Location <u>EACH END</u> <u>CENTER</u>

SPILLWAY:

	SERVICE			AUXILIARY
	BIRKETT	RODNEY HUNT (2)		
INVERT)	709	708.43	Elevation	716.04
	GATE	GATE	Type	MASONRY; DROP STRUCTURE
	4'	4.5'	Width	3' ~~8'x8'~~
			Type of Control	
	MANUAL HOIST	MANUAL HOIST	Uncontrolled	✓
			Controlled:	
	—	—	Type (Flashboards; gate)	N/A
	1	2	Number	—
	4' x 5.4'	4.5' x 4.5'	Size/Length	50.8'
			Invert Material	MASONRY
			Anticipated Length of operating service	—
	N/A	N/A	Chute Length	N/A
	N/A	N/A	Height Between Spillway Crest & Approach Channel Invert (Weir Flow)	—O—

HYDROMETEROLOGICAL GAGES:

USGS RECORDER

Type : WATER STAGE — LAKE   STAFF @ DAM

Location: HAMMONDSPORT   ON SHEET PILE WALL

Records:

   Date - 6/24/72

   Max. Reading - 719.35

FLOOD WATER CONTROL SYSTEM:

Warning System: NO

Method of Controlled Releases (mechanisms):

   SERVICE SPILLWAYS (BIRKETT GATE & 2 RODNEY HUNT GATES)

DRAINAGE AREA: ___182 SQ MILES___   ___116,480 ACRES___

DRAINAGE BASIN RUNOFF CHARACTERISTICS:

    Land Use - Type: ___AGRICULTURAL (VINEYARDS)___

    Terrain - Relief: ___MODERATE TO STEEP___

    Surface - Soil: ___TILLABLE - SLOW INFILTRATION___

    Runoff Potential (existing or planned extensive alterations to existing
                (surface or subsurface conditions)

      ___N/A_____

      _____

      _____

    Potential Sedimentation problem areas (natural or man-made; present or future)

      ___NO_____

      _____

      _____

    Potential Backwater problem areas for levels at maximum storage capacity
           including surcharge storage:

      ___NONE ; EXCEPT FOR THOSE STRUCTURES AROUND ENTIRE___

          ___PERIMETER OF LAKE___

      _____

    Dikes - Floodwalls (overflow & non-overflow) - Low reaches along the
        Reservoir perimeter:

      Location: ___NO___

      Elevation: _____

Reservoir:

      Length @ Maximum Pool _____ __20±__ (Miles)

      Length of Shoreline (@ Spillway Crest)_____ __55±__ (Miles)

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

JOB KEUKA LAKE	SHEET NO. 1	CHECKED BY	DATE
SUBJECT WATERSHED PARAMETERS		COMPUTED BY WCL	DATE 6/17/80

DRAINAGE AREA — LAKE SURFACE AREA:
(DA)   (LSA)

181.44 SQ MI.   18.15 SQ MI.   PLANIMETERED
                       (11620 ACRES) ←

→ 182 SQ MI.   18.3 SQ MI.   USGS GAGE #04232450
                                          @ HAMMONDSPORT

178.5 SQ MI.   17.5 SQ MI.   CORPS ENGINEERS RPT:
                                          KEUKA OUTLET — 6/1960

196 SQ MI.   18.3 SQ MI.   BULL 68 — GAZETTEER

PMP — RAINFALL:

HMR #33   HMR #51
   ON ZONE BOUNDARY (1 & 2)

→ 200 SQ MI — 24 HR = 22" (INDEX)

AREA (SQ MI)	HRS	DEPTH
10	6	24.5
	12	28
	24	30
	48	33
	72	34.5
200	6	16.5
	12	19.5
	24	22
	48	24.5
	72	25.5
1000	6	12
	12	14.8
	24	17
	48	19.5
	72	20.5

(HRS)	ZONE 1			ZONE 2
		AVE (INS)		
6	76	79	17.4	81
12	90	91	20	91
24	101	101	22.2	101
48	107	110	24.2	112

5,000	6	7.2
	12	10.1
	24	12.1
	48	14.4
	72	15.6

USE #33

KEUKA LAKE DAM
NY-390

PMP DEPTH-AREA-
DURATION CURVES

DURATION (HRS)

6   12 24 48 72

RAINFALL DEPTH (INS.)

DRAINAGE AREA (SQ. MILES)
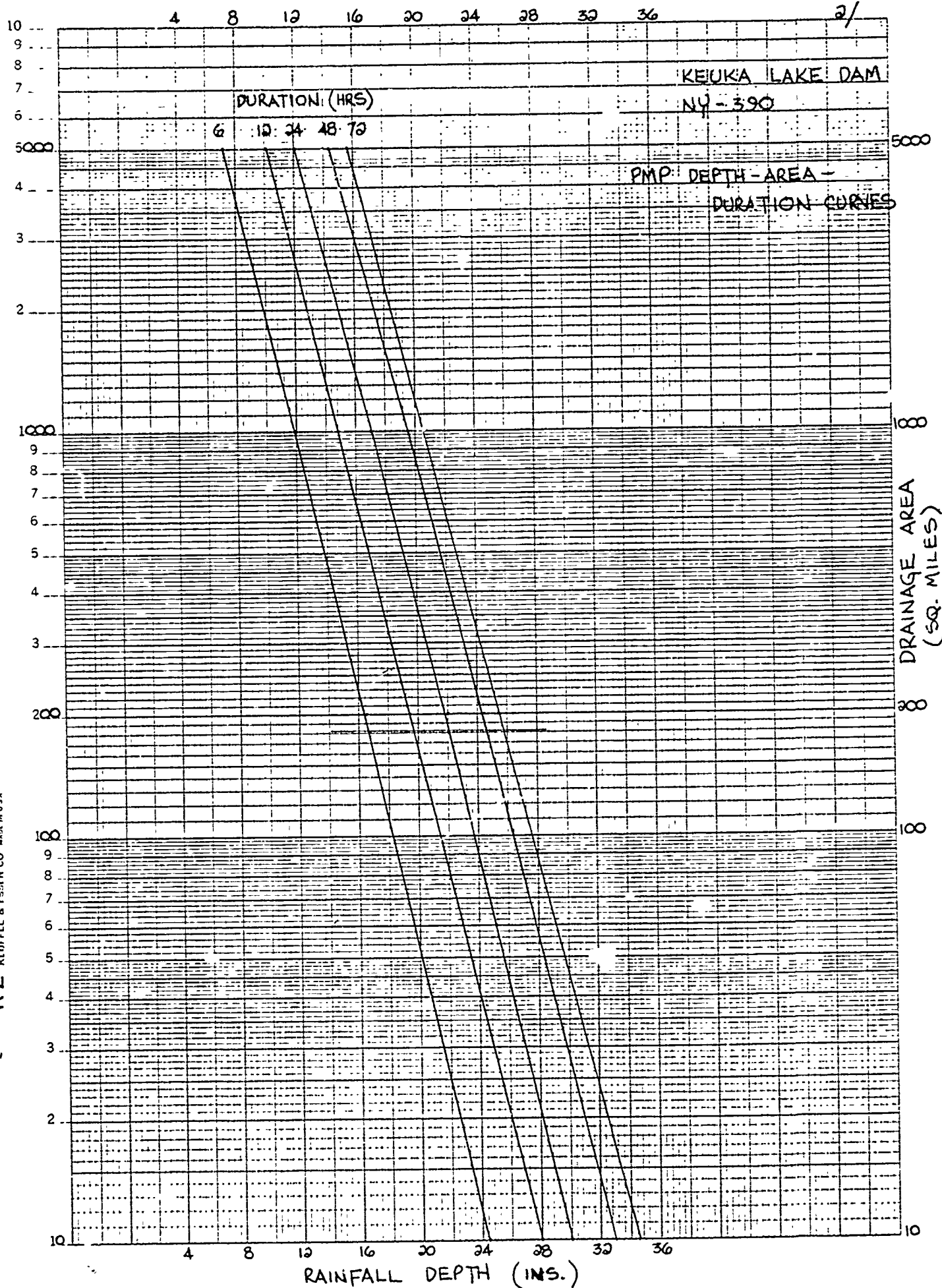
JOB		SHEET NO.	CHECKED BY	DATE
KEUKA LAKE		3/		
SUBJECT			COMPUTED BY	DATE
WATERSHED PARAMETERS			WCL	6/18/80

PMP - RAINFALL:

HMR #51 PLOT OF D-A-D:

FOR DA = 182 SQ MI.

DURATION =	6	12	24	48	72
DEPTH (INS) $\longrightarrow$	16.6	19.7	22	24.6	25.8
(USING INDEX = 24 HR EVENT) %:	75.5	89.5	100	111.8	117.3

SNYDER SYNTHETIC UNIT HYDROGRAPH:

DA = 182 SQ MI.

LONGEST DRAINAGE PATH = L = 29.4 MI.

DIST. TO CENTROID OF DA = L_{CA} = 14.6 MI.

(USE) C_t = 2.0   SLOPES (MODERATE TO STEEP)

LAG TIME = t_p = $C_t \left(L \times L_{CA} \right)^{0.3}$

t_p = $2 \left(29.4 \times 14.6 \right)^{0.3}$

t_p = 12.32 HRS

UNIT RAINFALL DURATION = t_r = $\dfrac{t_p}{5.5}$

t_r = 2.24 HRS

(USE) t_R = 2

ADJUSTED LAG TIME = T_p = $t_p + 0.25 \left(t_R - t_r \right)$

T_p = 12.32 + 0.25 (2 - 2.24)

T_p = 12.26 HRS

PEAKING COEFF = C_p = 0.625

JOB KEUKA LAKE	SHEET NO. 4/	CHECKED BY	DATE
SUBJECT WATERSHED PARAMETERS		COMPUTED BY WCL	DATE 6/19/80

SOIL INFILTRATION (LOSS RATES):

SOIL NAME:	SCS SOIL GROUP	LOSS (INS/HR)
(MAJOR)		
E4 — MARDIN	C	0.1
Ew2 (WET) — VOLUSIA	C	0.1
(MINOR)		
Aw1 (WET) — APPLETON	C	0.1
A3 — HONEOYE	B	0.2
Dh5 (HILLY·STEEP) — LORDSTOWN-MARDIN	C	0.1
H2 — HOWARD	B	0.2

REF: OSWEGO RIVER BASIN - STUDY:

$$ $$

(INS/HR)

LOSS RATES:
INITIAL = 1.50
CONSTANT = 0.03

BASED UPON MODELING CALIBRATED TO JUNE 1972 EVENT (AGNES)

BASE FLOW:
STRTQ = 100 cfs
QRCSN = 800 cfs
RTIOR = 1.6

SAME

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

JOB		SHEET NO.	CHECKED BY	DATE
KEUKA LAKE		5/		
SUBJECT			COMPUTED BY	DATE
STAGE - STORAGE DATA			WCL	6/19/80

CORPS ENGINEERS (6/1960 REPORT)

PLATE I - 11 : KEUKA OUTLET

ELEV.	AC-FT (x 1000)
721.7	240
721	230
720	217
718	191
716	166
714	142 ← [USE AS NORMAL POOL]
712	119
710	97
708	76

ELEVATION IN FEET – U.S.C. & G.S. DATUM

724

720

716

712

708

704

700

0   40   80   120   160   200   240

STORAGE, 1000 ACRE-FEET
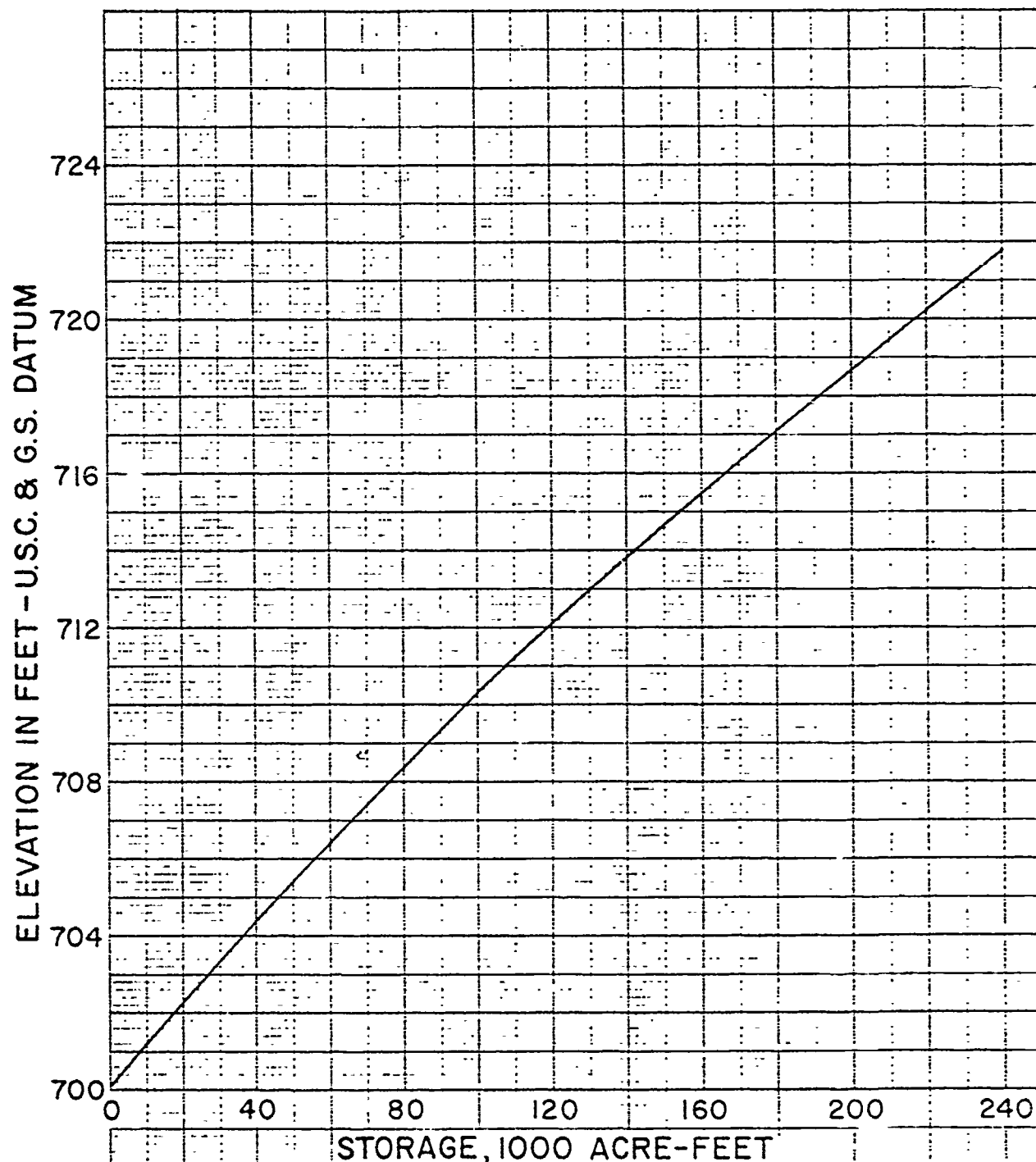
OSWEGO RIVER WATERSHED, NEW YORK

KEUKA LAKE OUTLET

PENN YAN, NEW YORK

STORAGE CAPACITY CURVE

KEUKA LAKE

U.S. ARMY ENGINEER DISTRICT. BUFFALO

TO ACCOMPANY PROJECT REPORT (PUBLIC LAW 685)
DATED: JUNE 1960

APPENDIX PLATE I-11

PROJECT GRID

JOB		SHEET NO.	CHECKED BY	DATE
KEUKA LAKE		6/		

SUBJECT		COMPUTED BY	DATE
MASONRY SPILLWAY (CENTER) - DISCHARGE CAPACITY		WCL	6/20/80

SINGLE SPILLWAY @ 50.3' = CREST LENGTH (FIELD MEASURED)

CORPS ENGINEERS (6/1960 RPT) - KEUKA OUTLET

RATING CURVE USING $Q = CLH^{3/2}$: PLATE I-9

CREST @ 716.04

L = 50.8'   C = 3.1

WATER SURF. ELEV.	H	Q
716.04 (USE 716)	—	—
716.5	0.5	55
717	1	155
717.5	1.5	285
718	2	445
718.5	2.5	620
718.75	2.75	715
719	3	815

TOP ABUT —

KEUKA LAKE OUTLET DAM

NY-390

NOTES
1. HEADWATER ELEVATION IS GAGE READING MINUS 0.36'
2. DAM CREST ELEVATION 716.04

OSWEGO RIVER WATERSHED, NEW YORK
KEUKA LAKE OUTLET
PENN YAN, NEW YORK

RATING CURVE
MAIN STREET DAM

U.S. ARMY ENGINEER DISTRICT, BUFFALO
TO ACCOMPANY PROJECT REPORT (PUBLIC LAW 685)
DATED: JUNE 1960

APPENDIX PLATE 1-9

DISCHARGE IN C.F.S.

100 200 300 400 500 600 700 800 900
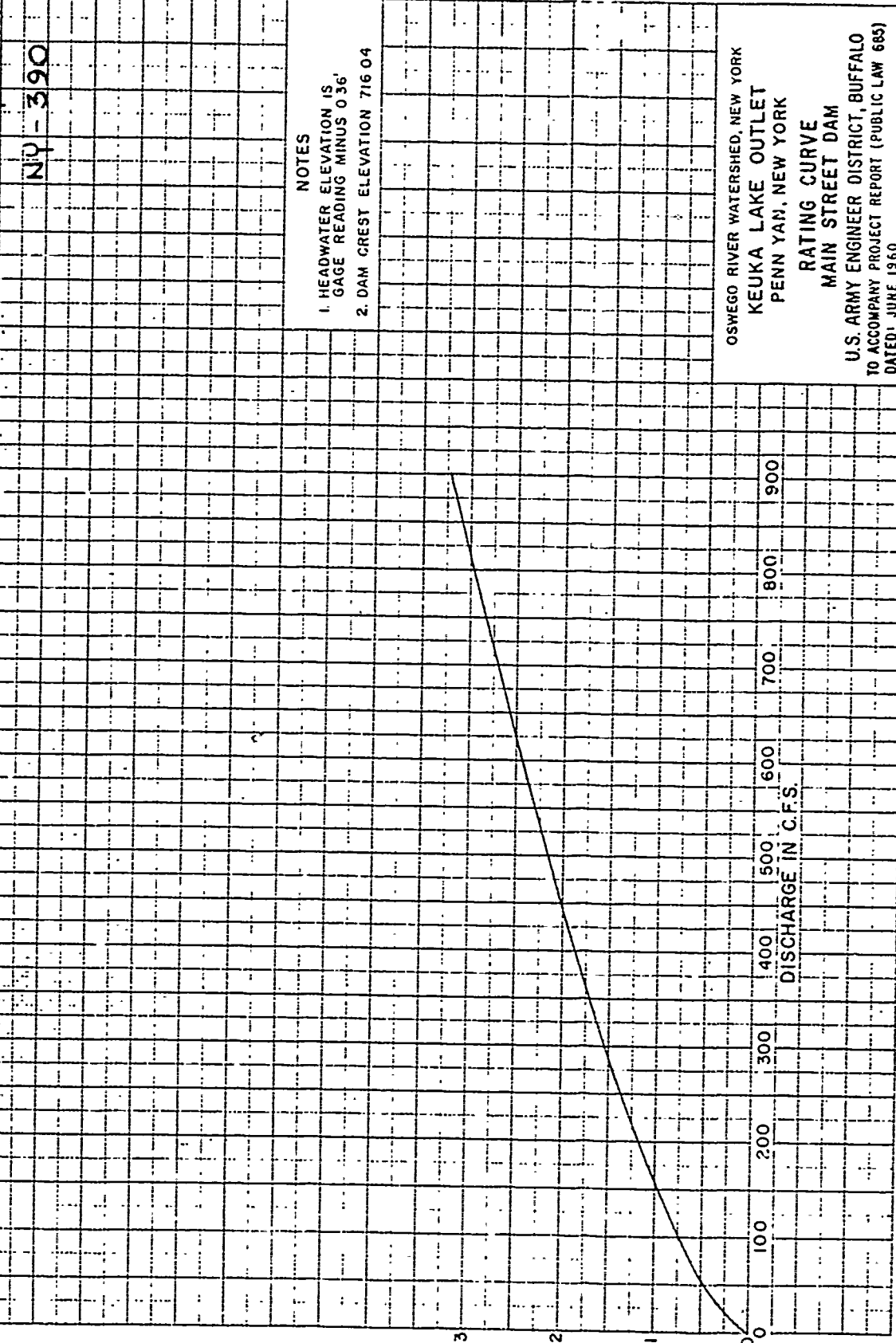
HEAD IN FEET
HEADWATER ELEV - DAM CREST ELEV.

6A/

00-15-1 (3/78)
Formerly GA-17

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

JOB KEUKA LAKE	SHEET NO. 7/	CHECKED BY	DATE
SUBJECT RODNEY HUNT SLUICE GATES – DISCHARGE CAPACITY		COMPUTED BY WCL	DATE 6/20/80

TWIN 54" x 54" GATES — VARIABLE OPENING:
(4.5' x 4.5')

ORIFICE C ≈ 0.7   AREA = 20.25 SQ FT.
INVERT = 708.43
TOP OPENING = 712.93

WEIR FLOW: $Q = CLH^{3/2}$
ORIFICE FLOW: $Q = CA\sqrt{2gH}$

CONDITION: GATE FULLY OPEN (MAX CAPACITY):

WATER SURF ELEV
$L = 4.5$
$C = 2.77$ (SIMILAR TO BIRKETT GATE)

	ELEV	H	Q	2Q
INV.	708.43	—	—	—
	709	0.57	5.4	10.8
	710	1.57	24.5	49
	712	3.57	84	168
TOP	712.93	4.5	119	238
	713	4.57	122	244
	714	5.57	164	328
	714.4	5.97	182	364
	715	6.57	210	420
→	715.6	7.17	239	478

ORIFICE $H = \sqrt{H_{-} - 2.25}$

ASSUME SAME ELEV CAUSES ORIFICE FLOW TO OCCUR AT THESE GATES

$Q = (0.7)(20.25)\sqrt{2gH}$
$Q = 113.75\sqrt{H}$

	H_{-}	H	Q	2Q
	716	7.57	5.32	262	524
	716.5	8.07	5.82	274	548
	717	8.57	6.32	286	572
	717.5	9.07	6.82	297	594
	718	9.57	7.32	307	614
	718.5	10.07	7.82	318	636
TOP ABUT	718.75	10.32	8.07	323	646
	719	10.57	8.32	328	656

August 18, 1966

State of New York
Conservation Department
Division of Water Resources
Central Regional Office
418 East State Street
Ithaca, New York

Attention: Mr. Frank J. Keller, P.E.
             Senior Hydraulic Engineer

Subject: Keuka Lake Outlet Structure
           Sluice Gate
           Rodney Hunt Shop Order 63076-2

Gentlemen:

We have received your letter of July 11th but because of the preparation for vacations and the vacation we have not been able to answer it until now. We are sorry about this delay and hope that it has not seriously inconvenienced you.

You requested a discharge rating chart for th███████████████which we furnished on this project through R. E. Clark & Sons. We do not have a rating chart as such on this but our experience and the available literature would seem to indicate that a coefficient of discharge of 0.70 is reasonable for these gates. We have seen figures from 0.65 to 0.75 used and for our calculation purposes, we normally use the 0.70 figure. We believe that a stage-discharge curve based on this coefficient will be accurate enough to allow you to set the opening of the gate accordingly. Finer settings may be determined by experience over the years.

We hope that this information will satisfactorily meet your requirements. If we can assist you further in any way on this, please let us know.

Very truly yours,

RODNEY HUNT COMPANY

R.W. Henderson

R. W. Henderson, Manager
Water Control Equipment Division

RWH/bg

JOB		SHEET NO.	CHECKED BY	DATE
KEUKA LAKE		81		
SUBJECT			COMPUTED BY	DATE
BIRKETT GATE — DISCHARGE CAPACITY			WCL	6/20/80

SINGLE 4' x 5.4' GATE — NORMALLY @ FIXED OPENING:
(48" x 64.8")

ORIFICE AREA = 21.6 SQ FT
INVERT = 709.0
TOP OPENING = 714.4   TOP OF CONC @ GATE = 719.1 (MEASURED)   (FIELD)

CORPS ENGINEERS (6/1960 RPT) — KEUKA OUTLET

RATING CURVES FOR WEIR & ORIFICE FLOW: PLATES I-7 & I-8

CONDITION: GATE FULLY OPEN (MAX CAPACITY):

RECALCULATE "C":

$$C = \frac{Q}{L H^{3/2}}$$

L = 4'
NO TAILWATER

	WATER SURF. ELEV.	H	Q				$C = \frac{Q}{C}$
INV.	709	—	—				
	710	1	11			WEIR FLOW (PLATE I-7)	2.75
	712	3	58				2.79
	712.93	3.913	86				
	713	4	92				2.79
	714	5	124				2.77
TOP	714.4	5.4	139				2.77
	715	6	163				2.77
	715.6	6.6	188				2.77
	716	7	193	ORIFICE FLOW (PLATE I-8)			2.42 / 2.537
	716.5	7.5	199				
	717	8	206				2.42 / 2.516
	717.5	8.5	212				
	718	9	218				2.419 / 2.501
	718.75	9.75	227				
	719	10	230				2.419 / 2.491
	718.5	9.5	224				

H TO CENTER OF ORIFICE

ORIFICE FLOW:
$$C = \frac{Q}{A\sqrt{2gH}}$$

A = 21.6

KEUKA LAKE OUTLET DAM

NY-392

START ORIFICE FLOW
54 FEET OPEN

START ORIFICE FLOW
5 FEET OPEN

START ORIFICE FLOW
4 FEET OPEN

START ORIFICE FLOW
3 FEET OPEN

START ORIFICE FLOW
2 FEET OPEN

START ORIFICE FLOW
1 FOOT OPEN

NOTES

1 HEADWATER ELEVATION IS
GAGE READING MINUS 0.36'

2 TAILWATER PRODUCES NO EFFECT
FOR ANY GATE COMBINATIONS

X POINTS WHERE ORIFICE FLOW BEGINS

HEAD IN FEET
HW ELEV-SILL ELEV 709.0

DISCHARGE IN C.F.S.

20 40 60 80 100 120 140 160 180

OSWEGO RIVER WATERSHED, NEW YORK
KEUKA LAKE OUTLET
PENN YAN, NEW YORK
RATING CURVE - WEIR FLOW
BIRKETT GATE
U.S. ARMY ENGINEER DISTRICT, BUFFALO
TO ACCOMPANY PROJECT REPORT (PUBLIC LAW 685)
DATED: JUNE 1960

APPENDIX PLATE I-7

KEUKA LAKE OUTLET DAM

NY-390

NOTES

1 HEADWATER ELEVATION IS GAGE READING MINUS 0.3G'

2 TAILWATER FROM CURVE DATED 20 OCTOBER 1959

3 ORIFICE CONSIDERED UNSUBMERGED UNTIL TAILWATER IS ABOVE TOP OF OPENING

OSWEGO RIVER WATERSHED, NEW YORK

KEUKA LAKE OUTLET
PENN YAN, NEW YORK

RATING CURVE – ORIFICE FLOW
BIRKETT GATE

U.S ARMY ENGINEER DISTRICT, BUFFALO
TO ACCOMPANY PROJECT REPORT (PUBLIC LAW 685)
DATED: JUNE 1960

APPENDIX PLATE I-8

54 FEET FULLY OPEN

5 FEET OPEN

4 FEET OPEN

3 FEET OPEN

2 FEET OPEN

1 FOOT OPEN

DISCHARGE IN C.F.S

HEAD IN FEET
H FOR UNSUBMERGED = HEADWATER - (SILL + ½ GATE OPENING)
H FOR SUBMERGED = HEADWATER - TAILWATER

250

200

150

100

50

0

10

8

6

4

2

0

8B/
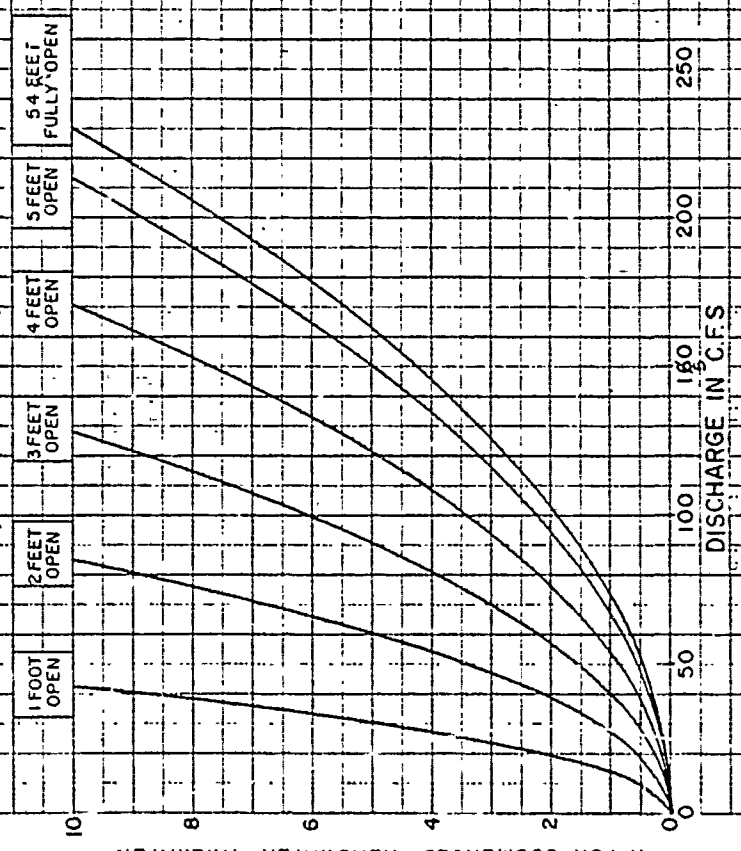
JOB		SHEET NO.	CHECKED BY	DATE
KEUKA LAKE		9		
SUBJECT			COMPUTED BY	DATE
DISCHARGE CAPACITY — NON-OVERFLOW SECTIONS (FLOOD CONDITION)			WCL	6/20/80

R/R UNDERPASS — 60' RT of SPILLWAY:

BROAD-CRESTED WEIR: $Q = CLH^{3/2}$

$L = 13'$ $C = 2.63$

CREST ELEV = 718.3

ELEV.	H	Q
718.3	—	—
718.5	0.2	3
718.75	0.45	10.3
719	0.7	20

BIRKETT GATE:

PLATFORM (OVERTOP)

$Q = CLH^{3/2}$
$C = 3.1$
$L = 15.8'$
CREST = 718.8

MASONRY WALLS BETWEEN GATE & CENTER SPILLWAY

$Q = CLH^{3/2}$
$C = 3.1$
$L = 29.9'$
CREST = 718.8

Q		H	ELEV.	H		Q
—		—	718.8	—		—
4		0.2	719	0.2		8

RODNEY HUNT GATE:

MASONRY WALLS BETWEEN GATE & CENTER SPILLWAY

$Q = CLH^{3/2}$ $C = 3.1$ $L = 14.5'$ CREST = 718.8

Q		H	ELEV.
—		—	718.8
4		0.2	719

PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
KEUKA LAKE	10/		

SUBJECT	COMPUTED BY	DATE
STAGE – DISCHARGE : SUMMARY	WCL	6/23/80

Stage (Elev)	Center Masonry Spillway	R-H Gates (2) (Fully-Open)	Birkett Gate (Fully-Open)	RR Underpass	Non-Overflow Sections (3)	Total (cfs)
708.43	—	—	—	—	—	—
709		10.8				10.8
710		49	11			60
712		168	58			226
713		244	89			333
714		328	124			452
715		430	163			583
715.6		478	188			666
716		504	193			717
716.5	55	548	199			802
717	155	570	204			933
717.5	285	594	212			1091
718	445	614	218			1277
718.5	620	636	224	3		1483
718.75	715	646	227	10		1598
719	815	656	230	20	16	1737

USE AS NORMAL POOL (at 714)

```
**************************************
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION   JULY 1978
LAST MODIFICATION  26 FEB 79
MODIFIED FOR HONEYWELL APR 79
**************************************
```

```
**************************************
NEW YORK STATE
DEPT OF ENVIRONMENTAL CONSERVATION
FLOOD PROTECTION BUREAU
**************************************
```

```
 1  A  KEUKA LAKE DAM            NY-390
 2  A                            VILLAGE OF PENN YAN
 3  A                            OSWEGO RIVER BASIN
 4  B   200    0    0    0    0  YATES COUNTY
 5  B1    5                      SNYDER UH
 6  J     1    1
 7  J1  0.5
 8  K     0  SUBBSN
 9  K1                INFLOW HYDROGRAPH
10  M     1    1  182  182
11  P     0   22   79   91  101  110
12  T                    1.5  0.03  0.1
13  W  12.26  0.625
14  X   100  800  1.6
15  K     1  DAM             2         1
16  K1         ROUTED HYDROGRAPH AT DAM - CENTER SPILLWAY AND ALL GATES
17  Y                    1    1
18  Y1    1              -713.99   -1
19  Y4708.43  713.99  714  715  715.6  716  716.5  717  717.5  718
20  Y4 718.5  718.75  719
21  Y5    0      0  452  583  666  717  802  933  1091  1277
22  Y5  1480   1588  1701
23  SS  76000  97000  119000  142000  166000  191000  217000  230000  240000
24  SE   708   710   712   714   716   718   720   721  721.7
25  SS   714
26  SD718.75  3.1  1.5  60.2
27  K     99
28  A
29  A
30  A
31  A
```

```
***********************
FLOOD HYDROGRAPH PACKAGE (HEC-1)                    NEW YORK STATE
DAM SAFETY VERSION   JULY 1978                       DEPT OF ENVIRONMENTAL CONSERVATION
  LAST MODIFICATION  26 FEB 79                       FLOOD PROTECTION BUREAU
  MODIFIED FOR HONEYWELL APR 79                      ***********************
***********************

RUN DATE 06/25/80      KEUKA LAKE DAM        NY-390           OSWEGO RIVER BASIN
                                             VILLAGE OF PENN YAN    YATES COUNTY
                                                                    SNYDER UH

                                          JOB SPECIFICATION
        NQ      NHR    NMIN    IDAY    IHR    IMIN   METRC    IPLT    IPRT    NSTAN
        200      2       0       0      0      0       0       0       0       0
                                JOPER   NWT   LROPT   TRACE
                                  5      0     0        0

                         MULTI-PLAN ANALYSES TO BE PERFORMED
                            NPLAN= 1  NRTIO= 2  LRTIO= 1

              RTIOS=  0.50    1.00


***********      ***********      ***********       ***********      ***********

                        SUB-AREA RUNOFF COMPUTATION

                    INFLOW HYDROGRAPH
            ISTAQ  ICOMP  IECON  ITAPE  JPLT  JPRT  INAME  ISTAGE  IAUTO
            SUBBSN    0     0      0      0     0      1      0       0

                    HYDROGRAPH DATA
     IHYDG  IUHG   TAREA   SNAP   TRSDA   TRSPC   RATIO   ISNOW  ISAME  LOCAL
       1      1    182.00   0.   182.00    0.      0.      0       1      1

                    PRECIP DATA
          SPFE    PMS     R6      R12     R24    R48     R72    R96
           0.    22.00   79.00   91.00  101.00  116.00   0.     0.

TRSPC COMPUTED BY THE PROGRAM IS 0.880

                    LOSS DATA
     LROPT  STRKR  DLTKR  RTIOL  ERAIN  STRKS  RTIOK  RTIOK  STRTL  CNSTL  ALSMX  RTIMP
       0      0.     0.    1.00    0.     0.    1.00   1.00   1.50   0.03    0.    0.10

                    UNIT HYDROGRAPH DATA
                    TP= 12.26    CP=0.63    NTA=   0

                    RECESSION DATA
                    STRTQ=  100.00    QRCSN=  800.00   RTIOR= 1.60
APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP AND TP ARE TC= 7.00 AND R= 5.50 INTERVALS

           UNIT HYDROGRAPH 33 END-OF-PERIOD ORDINATES, LAG= 12.14 HOURS, CP= 0.63   VOL= 1.00
       373.    1367.    2706.    4149.    5352.    6028.    6082.    5443.    4535.    3779.
      3149.    2624.    2186.    1822.    1518.    1265.    1054.    878.     732.     610.
       508.     423.    353.     294.     245.     204.     170.     142.     118.     98.
        82.      68.     57.

                                       END-OF-PERIOD FLOW
   0
  MO.DA  HR.MI  PERIOD  RAIN  EXCS  LOSS     MO.DA  HR.MN  PERIOD  RAIN  EXCS  LOSS  COMP Q
  1.01   2.00     1     0.02  0.00  0.02     1.01   10.00   101    0.    0.    0.     80.
  1.01   4.00     2     0.02  0.00  0.02     1.01   12.00   102    0.    0.    0.     76.
```

5

A numeric data printout (rotated 90°). The table is heavily degraded and the values cannot all be read reliably. Partially legible columns include index sequences and associated values.

Index	Value		Index	Value
103	1.07		3	1.01
104	1.09		4	1.01
105	1.09		5	1.01
106	1.09		6	1.01
107	1.09		7	1.01
108	1.10		8	1.01
109	1.10		9	1.01
110	1.10		10	1.02
111	1.10		11	1.02
112	1.10		12	1.02
113	1.10		13	1.02
114	1.10		14	1.02
115	1.10		15	1.02
116	1.10		16	1.02
117	1.10		17	1.02
118	1.10		18	1.02
119	1.10		19	1.02
120	1.11		20	1.03
121	1.11		21	1.03
122	1.11		22	1.03
123	1.11		23	1.03
124	1.11		24	1.03
125	1.11		25	1.03
126	1.11		26	1.03
127	1.11		27	1.03
128	1.11		28	1.03
129	1.11		29	1.04
130	1.11		30	1.04
131	1.12		31	1.04
132	1.12		32	1.04
133	1.12		33	1.04
134	1.12		34	1.04
135	1.12		35	1.04
136	1.12		36	1.04
137	1.12		37	1.04
138	1.12		38	1.04
139	1.12		39	1.04
140	1.13		40	1.04
141	1.13		41	1.04
142	1.13		42	1.04
143	1.13		43	1.05
144	1.13		44	1.05
145	1.13		45	1.05
146	1.13		46	1.05
147	1.13		47	1.05
148	1.13		48	1.05
149	1.13		49	1.05
150	1.13		50	1.05
151	1.13		51	1.05
152	1.13		52	1.05
153	1.14		53	1.05
154	1.14		54	1.05
155	1.14		55	1.05
156	1.14		56	1.05
157	1.14		57	1.06
158	1.14		58	1.06
159	1.14		59	1.06
160	1.14		60	1.06
161	1.14		61	1.06
162	1.14		62	1.06
163	1.14		63	1.06
164	1.14		64	1.06
165	1.14		65	1.06
166	1.14		66	1.06
167	1.14		67	1.06
168	1.15		68	1.06

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	103893.	100648.	72142.	30904.	1138800.
CMS	2942.	2850.	2043.	875.	32247.
INCHES		5.14	14.75	18.95	19.40
MM		130.67	374.63	481.44	492.81
AC-FT		49908.	143092.	183889.	188231.
THOUS CU M		61561.	176501.	226823.	232180.

SUM 21.30 19.19 2.12 1138842.
(541.)(487.)(54.)(32248.41)

HYDROGRAPH AT STASUBBSN FOR PLAN 1, RTIO 1

5

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	51947.	50324.	36071.	15452.	569400.
CMS	1471.	1425.	1021.	438.	16124.
INCHES		2.57	7.37	9.48	9.70
MM		65.33	187.31	240.72	246.41
AC-FT		24954.	71546.	91944.	94116.
THOUS CU M		30780.	88250.	113412.	116090.

HYDROGRAPH AT STASUBBSN FOR PLAN 1, RTIO 2

```
 96.    97.   104.   119.   142.   182.   269.   452.   734.
1049.  1608.  1947.  2422.  3279.  4873.  7324. 11754. 21424.
37846. 78940. 95214. 103893. 103319. 94251. 81231. 68689. 57715.
48218. 33481. 27900. 23249. 19374. 16145. 13454. 11212.  9342.
 7783.  6480.  5401.  4502.  3752.  3118.  2590.  2150.  1758.
 1160.   762.   727.   693.   661.   631.   602.   574.   548.
  523.   499.   476.   454.   433.   413.   394.   376.   359.   343.
  327.   312.   297.   284.   271.   258.   247.   235.   224.   214.
  204.   195.   186.   177.   169.   161.   154.   147.   140.   134.
  128.   122.   116.   111.   106.   101.    96.    92.    88.    84.
   80.    76.    73.    69.    66.    63.    60.    57.    55.    52.
   50.    48.    45.    43.    41.    39.    38.    36.    34.    33.
   31.    30.    28.    27.    26.    25.    24.    22.    21.    20.
   19.    19.    18.    17.    16.    15.    15.    14.    13.    13.
   12.    12.    11.    11.    10.    10.     9.     9.     9.     8.
    8.     7.     7.     7.     6.     6.     6.     5.     5.     5.
    5.     5.     4.     4.     4.     4.     4.     3.     3.     3.
    3.     3.     3.     3.     2.     2.     2.     2.     2.     2.
    2.     2.     1.     1.     1.     1.     1.     1.     1.     1.
    1.     1.
```

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	103893.	100648.	72142.	30904.	1138800.
CMS	2942.	2850.	2043.	875.	32247.
INCHES		5.14	14.75	18.95	19.40
MM		130.67	374.63	481.44	492.81
AC-FT		49908.	143092.	183889.	188231.
THOUS CU M		61561.	176501.	226823.	232180.

********** ********** ********** ********** ********** ********** **********

HYDROGRAPH ROUTING

ROUTED HYDROGRAPH AT DAM - CENTER SPILLWAY AND ALL GATES

ISTAQ	ICOMP	ITAPE	IECON	JPLT	IOPT	JPRT	IPMP	INAME	ISTAGE	IAUTO
DAM	1	0	0	2	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	I8AME	X	AMSKK	LAG	TSK	STORA	ISPRAT	LSTR
0.	0.	0.	1	1	0.	0.	0.	0.	-714.	-1	0

	NSTPS	NSTDL				
	1	0				

STAGE
708.43 708.50 713.99 714.00 715.00 715.60 716.00 716.50 717.00 717.50 718.00
718.75 718.75 719.00

FLOW
0. 0. 452.00 583.00 666.00 802.00 933.00 1091.00 1277.00
1480.00 1588.00 1701.00

CAPACITY= 76000. 97000. 119000. 142000. 166000. 191000. 217000. 230000. 240000.

ELEVATION= 708. 710. 712. 714. 716. 718. 720. 721. 722.

CREL	SPWID	CUQW	EXPW	ELEVL	COQL	CAHEA	EXPL
714.0	0.	0.	0.	0.	0.	0.	0.

DAM DATA

TOPEL	COQD	EXPD	DAMWID
718.8	3.1	1.5	60.

STATION   DAM, PLAN 1, RATIO 1

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

22.	34.	40.	45.	50.	57.	68.	88.	130.	206.
315.	452.	453.	453.	454.	456.	459.	464.	471.	486.
511.	554.	617.	696.	800.	984.	1203.	1419.	1616.	1839.
2047.	2228.	2381.	2507.	2609.	2691.	2754.	2802.	2837.	2861.
2876.	2883.	2884.	2880.	2870.	2859.	2844.	2827.	2808.	2787.
2765.	2741.	2717.	2693.	2670.	2646.	2623.	2599.	2576.	2553.
2531.	2508.	2486.	2464.	2442.	2420.	2399.	2378.	2357.	2336.
2315.	2295.	2275.	2255.	2235.	2216.	2196.	2177.	2159.	2140.
2122.	2103.	2086.	2068.	2050.	2033.	2016.	1999.	1983.	1966.
1950.	1934.	1918.	1903.	1887.	1872.	1857.	1843.	1828.	1814.
1800.	1786.	1773.	1759.	1746.	1733.	1720.	1708.	1695.	1683.
1671.	1659.	1648.	1637.	1626.	1615.	1605.	1595.	1586.	1577.
1569.	1560.	1552.	1543.	1535.	1526.	1518.	1510.	1502.	1494.
1485.	1477.	1470.	1462.	1455.	1447.	1440.	1433.	1425.	1418.
1411.	1404.	1396.	1389.	1382.	1375.	1368.	1361.	1354.	1347.
1340.	1333.	1326.	1319.	1313.	1306.	1299.	1293.	1286.	1279.
1273.	1267.	1261.	1254.	1248.	1242.	1236.	1230.	1224.	1218.
1212.	1206.	1200.	1194.	1188.	1183.	1177.	1171.	1165.	1160.
1154.	1148.	1143.	1137.	1131.	1126.	1120.	1115.	1109.	1104.
1099.	1093.	1088.	1084.	1079.	1075.	1070.	1066.	1061.	1057.

STORAGE

141891.	141894.	141895.	141896.	141898.	141899.	141902.	141907.	141918.	141937.
141965.	142000.	142047.	142119.	142225.	142385.	142646.	143074.	143785.	145077.
147444.	151333.	156911.	163999.	172103.	180518.	185500.	195535.	201479.	206417.
210473.	213773.	216436.	218568.	220258.	221581.	222597.	223360.	223912.	224289.
224522.	224635.	224649.	224582.	224449.	224260.	224025.	223753.	223449.	223119.
222768.	222395.	222009.	221623.	221239.	220856.	220475.	220094.	219715.	219338.
218962.	218588.	218216.	217845.	217476.	217109.	216744.	216382.	216021.	215662.
215305.	214951.	214598.	214248.	213900.	213554.	213210.	212868.	212529.	212192.
211857.	211524.	211194.	210866.	210540.	210216.	209894.	209575.	209258.	208943.
208630.	208319.	208011.	207704.	207400.	207098.	206798.	206499.	206204.	205910.
205618.	205328.	205040.	204754.	204470.	204188.	203902.	203629.	203352.	203078.
202805.	202533.	202264.	201996.	201730.	201465.	201202.	200941.	200681.	200422.
200165.	199909.	199654.	199401.	199148.	198897.	198648.	198399.	198152.	197907.
197662.	197419.	197177.	196936.	196696.	196457.	196220.	195984.	195749.	195515.
195282.	195051.	194820.	194591.	194363.	194136.	193910.	193685.	193461.	193239.
193017.	192797.	192578.	192363.	192143.	191927.	191712.	191498.	191286.	191074.
190864.	190654.	190439.	190233.	190033.	189828.	189623.	189420.	189216.	189017.
188816.	188617.	188418.	188221.	188024.	187829.	187634.	187440.	187248.	187056.
186865.	186675.	186486.	186298.	186110.	185924.	185739.	185554.	185370.	185188.
185006.	184825.	184645.	184465.	184287.	184109.	183932.	183755.	183579.	183404.

STAGE

714.0	714.0	714.0	714.0	714.0	714.0	714.0	714.0	714.0	714.0
714.0	714.0	714.0	714.0	714.0	714.1	714.1	714.1	714.1	714.3
714.5	714.8	715.2	715.8	716.5	717.2	717.8	718.3	718.8	719.2
719.5	719.8	720.0	720.1	720.3	720.4	720.4	720.5	720.5	720.6
720.6	720.6	720.4	720.6	720.5	720.6	720.2	720.2	720.2	720.5
720.4	720.4	720.4	720.3	720.3	720.3	720.3	720.2	720.2	720.2
720.2	720.1	720.1	720.1	720.0	720.0	720.0	720.0	719.9	719.9
719.9	719.8	719.8	719.8	719.8	719.7	719.7	719.7	719.7	719.6
719.6	719.6	719.6	719.5	719.5	719.5	719.5	719.5	719.6	719.6

PEAK OUTFLOW IS   2884. AT TIME   86.00 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	2884.	2882.	2852.	2671.	318232.
CMS	82.	82.	81.	76.	9011.
INCHES		0.15	0.58	1.6?	5.42
MM		3.74	14.81	41.61	137.71
AC-FT		1429.	5657.	15895.	52600.
THOUS CU M		1763.	6978.	19606.	64881.

```
719.1   719.1   719.1   719.0   719.0   719.0   719.2   719.1
718.9   718.9   719.0   718.8   718.8   718.8   719.0   718.9
718.7   718.8   718.8   718.6   718.8   718.8   718.7   718.7
718.5   718.6   718.6   718.4   718.6   718.6   718.6   718.5
718.3   718.5   718.4   718.2   718.4   718.4   718.4   718.3
718.1   718.3   718.3   718.1   718.2   718.2   718.2   718.2
718.0   718.1   717.9   717.9   718.1   718.0   718.0   718.0
717.8   717.9   717.8   717.7   717.9   717.9   717.9   717.8
717.7   717.8   717.6   717.6   717.7   717.7   717.7   717.7
717.5   717.6   717.5   717.4   717.6   717.6   717.5   717.5
        717.5                   717.4   717.4   717.4   717.4
```

STATION   DAM, PLAN 1, RATIO 2

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

44.	68.	81.	90.	100.	114.	136.	177.	260.	416.
453.	454.	456.	458.	461.	466.	472.	482.	499.	528.
580.	670.	814.	1159.	1691.	2596.	3600.	4517.	5339.	6046.
6640.	7128.	7521.	7832.	8073.	8254.	8385.	8474.	8527.	8551.
8551.	8532.	8496.	8447.	8387.	8319.	8244.	8163.	8079.	7990.
7899.	7806.	7711.	7618.	7525.	7434.	7344.	7255.	7167.	7081.
6995.	6911.	6827.	6745.	6664.	6584.	6505.	6427.	6350.	6274.
6199.	6126.	6053.	5981.	5910.	5841.	5772.	5704.	5637.	5571.
5506.	5442.	5379.	5317.	5255.	5195.	5135.	5074.	5018.	4961.
4904.	4849.	4794.	4740.	4687.	4634.	4583.	4532.	4481.	4432.
4383.	4335.	4287.	4240.	4194.	4148.	4102.	4059.	4016.	3973.
3930.	3888.	3847.	3806.	3766.	3727.	3688.	3649.	3611.	3574.
3537.	3501.	3465.	3430.	3395.	3360.	3326.	3293.	3260.	3227.
3192.	3157.	3123.	3090.	3052.	3024.	2992.	2961.	2930.	2899.
2869.	2839.	2809.	2780.	2752.	2724.	2696.	2669.	2642.	2615.
2589.	2563.	2538.	2513.	2488.	2464.	2440.	2416.	2393.	2370.
2347.	2325.	2303.	2281.	2260.	2239.	2218.	2198.	2178.	2158.
2138.	2119.	2100.	2081.	2063.	2045.	2027.	2009.	1992.	1975.
1958.	1941.	1925.	1909.	1893.	1878.	1862.	1847.	1832.	1818.
1803.	1789.	1775.	1761.	1748.	1734.	1721.	1709.	1696.	1684.

STORAGE

141800.	141902.	141906.	141908.	141910.	141914.	141920.	141930.	141951.	141991.
142066.	142189.	142357.	142575.	142860.	143255.	143851.	144780.	146276.	148933.
153740.	161590.	172817.	187047.	203266.	220057.	235953.	249685.	261260.	270766.
278472.	284640.	289517.	293321.	296233.	298407.	299967.	301020.	301653.	301941.
301942.	301709.	301284.	300702.	299993.	299180.	298283.	297319.	296300.	295236.
294137.	293000.	291847.	290703.	289569.	288445.	287330.	286225.	285131.	284046.
282971.	281906.	280852.	279807.	278772.	277747.	276732.	275727.	274732.	273747.
272771.	271805.	270849.	269903.	268966.	268039.	267121.	266212.	265313.	264423.
263542.	262670.	261807.	260953.	260108.	259272.	258444.	257626.	256815.	256013.
255219.	254434.	253657.	252887.	252126.	251373.	250628.	249890.	249160.	248437.
247723.	247015.	246315.	245622.	244936.	244257.	243585.	242920.	242262.	241611.
240966.	240328.	239696.	239071.	238452.	237840.	237233.	236633.	236039.	235450.
234868.	234291.	233720.	233155.	232595.	232041.	231493.	230949.	230411.	229880.
229357.	228839.	228326.	227819.	227316.	226819.	226326.	225839.	225356.	224878.
224405.	223937.	223473.	223014.	222559.	222109.	221663.	221222.	220785.	220352.
219924.	219499.	219079.	218663.	218251.	217843.	217438.	217038.	216641.	216249.
215860.	215474.	215093.	214714.	214340.	213969.	213601.	213237.	212876.	212518.
212163.	211812.	211464.	211118.	210776.	210437.	210101.	209768.	209437.	209110.
208785.	208463.	208144.	207827.	207513.	207202.	206893.	206587.	206283.	205981.
205568.	205386.	205091.	204799.	204509.	204222.	203936.	203653.	203372.	203093.

STAGE

714.0	714.0	714.0	714.0	714.0	714.0	714.0	714.0	714.0	714.0
714.0	714.0	714.0	714.0	714.1	714.1	714.1	714.2	714.4	714.6
715.0	715.6	716.5	717.7	718.9	720.2	721.4	722.4	723.2	723.9
724.4	724.8	725.2	725.4	725.6	725.8	725.9	726.0	726.0	726.0
726.0	726.0	726.0	725.9	725.9	725.8	725.8	725.7	725.6	725.6
725.5	725.4	725.3	725.2	725.2	725.1	725.0	724.9	724.9	724.8
724.7	724.6	724.6	724.5	724.4	724.3	724.3	724.2	724.1	724.1
723.9	723.9	723.8	723.8	723.7	723.6	723.6	723.5	723.5	723.4
723.3	723.3	723.2	723.2	723.1	723.0	723.0	722.9	722.9	722.8
722.8	722.7	722.7	722.6	722.5	722.5	722.4	722.4	722.3	722.3
722.2	722.2	722.1	722.1	722.0	722.0	722.0	721.9	721.9	721.8

OVN

```
721.0   721.0   721.1   721.1   721.1   721.0
720.6   720.6   720.7   720.7   720.8   720.6
720.3   720.3   720.3   720.4   720.4   720.3
719.7   720.0   720.0   720.0   720.1   720.0
719.7   719.7   719.7   719.8   719.8   719.7
719.4   719.4   719.4   719.5   719.5   719.4
719.2   719.2   719.2   719.2   719.2   719.2
718.9   719.0   719.0   719.0   719.0   718.9
```

PEAK OUTFLOW IS   8551.   AT TIME   82.00 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	8551.	8544.	8427.	7725.	768743.
CMS	242.	242.	239.	219.	21768.
INCHES		0.44	1.72	4.74	13.10
MM		11.09	43.76	120.34	332.67
AC-FT		4237.	16714.	45965.	127065.
THOUS CU M		5226.	20617.	56698.	156732.

Page end 86 of Turp

10

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIO 1	RATIO 2
				0.50	1.00
HYDROGRAPH AT	SUBBSN	182.00	1	51947.	103893.
		(0.00)		(1470.97)(	2941.93)(
ROUTED TO	DAM	182.00	1	2884.	8551.
		(0.00)		(81.67)(	242.15)(

RATIOS APPLIED TO FLOWS

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	713.99	714.00	718.75
STORAGE	141885.	142000.	200750.
OUTFLOW	0.	452.	1588.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.50	720.59	1.84	224649.	2884.	180.00	96.00	0.
1.00	726.04	7.29	301942.	8551.	352.00	112.00	0.

```
*********************************
FLOOD HYDROGRAPH PACK/   (HEC-1)
DA. SAFETY VERSION    JULY 1978
LAST MODIFICATION  28 FEB 79
MODIFIED FOR DAM-EVAFLL  28 79
*********************************
```

```
                              *********************************
                              NEW YORK STATE
                              DEPT U.S. ENVIRONMENTAL CONSERVATION
                              FLOOD PROTECTION BUREAU
                              *********************************

                              OSWEGO RIVER BASIN
                              YATES COUNTY
                              SNYDER UH
```

```
                NY-190
                VILLAGE OF PLEASANT VAN

  1   A   KEUKA LAKE DAM
  2   A
  3   A
  4   B1  200      0    0    0    0    0
  5       5
  6   J   1        1         2
  7   J1  0.5      1
  8   K   0  SUBBSN
  9   KK

              INFLOW HYDROGRAPH

 10   M   1        1         1
 11   P   0   22   79   91  101  110
 12   T                          1.5   0.03   0.1
 13   N   12.26  0.625
 14       100    1.6           1
 15       1     DAM            2         1

          ROUTED HYDROGRAPH AT DAM - CENTER SPILLWAY ONLY

 16   K1
 17   Y                          1
 18   Y1  1
 19   Y4  714  716  716.5  717  717.5  718  718.5  718.75  719
 20   Y5  0    0    55    155   285   445   620    715    815
 21   SS  76000  97000  119000  142000  169000  191000  217000  230000  240000
 22   SF  708   710    712     714     716     718     720     721    721.7
 23   SS  716
 24   SD718.75  1.5   60.2
 25   K   99
 26   A
 27   A
 28   A
 29   A
 30   A
```

PEAK FLOW AND STORAGE (CR.. OF PE (i..) SUMMARY FORMULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS (IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

RATIOS APPLIED TO FLOWS

LOCATION	STATION	AREA	PLAN	RATIO 1 1.5	RATIO 2 1.00
HYDROGRAPH AT	SUBBSN	162.00 (0.00)	1	51947. (1470.97)	103893. (2941.91)
ROUTED TO	DAM	162.00 (0.00)	1	2147. (60.81)	7033. (216.39)

CENTER
SPILLWAY
ONLY

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 ....

	ELEVATION	STORAGE	OUTFLOW
INITIAL VALUE	714.00	142000.	0.
SPILLWAY CREST	716.00	166000.	0.
TOP OF DAM	718.75	200750.	715.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.50	720.82	2.13	221444.	2147.	320.00	98.00	0.
1.00	725.33	7.58	306104.	7638.	352.00	92.00	0.

```
****************
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION    JULY 1978
LAST MODIFICATION 26 FEB 79
MODIFIED FOR HONEYWELL APR 79
****************
```

```
****************
NEW YORK STATE
DEPT OF ENVIRONMENTAL CONSERVATION
FLOOD PROTECTION BUREAU
****************
```

```
1    A  KEUKA LAKE DAM
2    A
3    A                                              NY-390              OSWEGO RIVER BASIN
4    B   200    2      0       0      0      0       VILLAGE OF PENN YAN    YATES COUNTY
5    B1    5                                                                SNYDER DH
6    J     1    7
7    Ji  0.3  0.31  0.32   0.33   0.34   0.35   0.5    0
8    K    0         SUBBSN
9    K1
10   M    1    1    182     182    182
11   P    0   22     79      91    101    110
12   T
13   W  12.26  0.625        1.6    1.5   0.03    0.1
14   X   100  800
15   K    1         DAM
16   K1                            ROUTED HYDROGRAPH AT DAM - CENTER SPILLWAY ONLY
17   Y                     1      1      1       1
18   Y1    1                                          -713.99        -1
19   Y 4713.99  716  716.5  717   717.5   718   718.5  718.75   719
20   Y5    0     0    55    155    285    445    620    715     815
21   SS 76000 97000 119000 142000 166000 191000 217000 230000 240000
22   SE   708   710   712    714    716    718    720    721   721.7
23   SS   716   716
24   SD  718.75 3.1   1.5   60.2
25   K    99
26   A
27   A
28   A
29   A
30   A
```

INFLOW HYDROGRAPH

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FORMULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS						
				RATIO 1 0.30	RATIO 2 0.31	RATIO 3 0.32	RATIO 4 0.33	RATIO 5 0.34	RATIO 6 0.35	RATIO 7 0.50
HYDROGRAPH AT	SUBBSN	182.00 (5541.69)	1	31168. (882.58)	32207. (912.00)	33246. (941.42)	34285. (970.84)	35324. (1000.26)	36363. (1029.68)	51947. (1470.97)
ROUTED TO	DAM	182.00 (5541.69)	1	572. (16.19)	618. (17.49)	667. (18.89)	717. (20.30)	778. (22.02)	845. (23.92)	2141. (60.64)

CENTER
SPILLWAY
ONLY

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	713.99	716.00	718.75
STORAGE	141885.	166000.	200750.
OUTFLOW	0.	0.	715.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.30	718.36	0.	195710.	572.	0.	98.00	0.
0.31	718.49	0.	197411.	618.	0.	96.00	0.
0.32	718.62	0.00	199111.	667.	0.	96.00	0.
0.33	718.75	0.00	200809.	717.	0.	96.00	0.
0.34	718.88	0.13	202488.	778.	10.00	96.00	0.
0.35	719.01	0.26	204156.	845.	60.00	94.00	0.
0.50	720.87	2.12	228347.	2141.	320.00	88.00	0.

OSWEGO RIVER BASIN

BASIN MAP

U.S. ARMY ENGINEER DISTRICT, BUFFALO

LAKE ONTARIO

KEUKA LAKE WATERSHED

N

PENN YAN

KEUKA LAKE OUTLET

DAM SITE

PRATTSBURG

KEUKA LAKE

LEGEND

○ NON-RECORDING PRECIPITATION GAGE

⊞ N.Y.S.E. & G. LAKE LEVEL STAFF GAGE

⊙ NON-RECORDING PRECIPITATION AND TEMPERATURE GAGE

KEUKA

HAMMONDSPORT

BRADFORD

BATH

5   0   5
SCALE OF MILES

OSWEGO RIVER WATERSHED, NEW YORK
KEUKA LAKE OUTLET
PENN YAN, NEW YORK

DRAINAGE AREA MAP
KEUKA LAKE OUTLET DAM
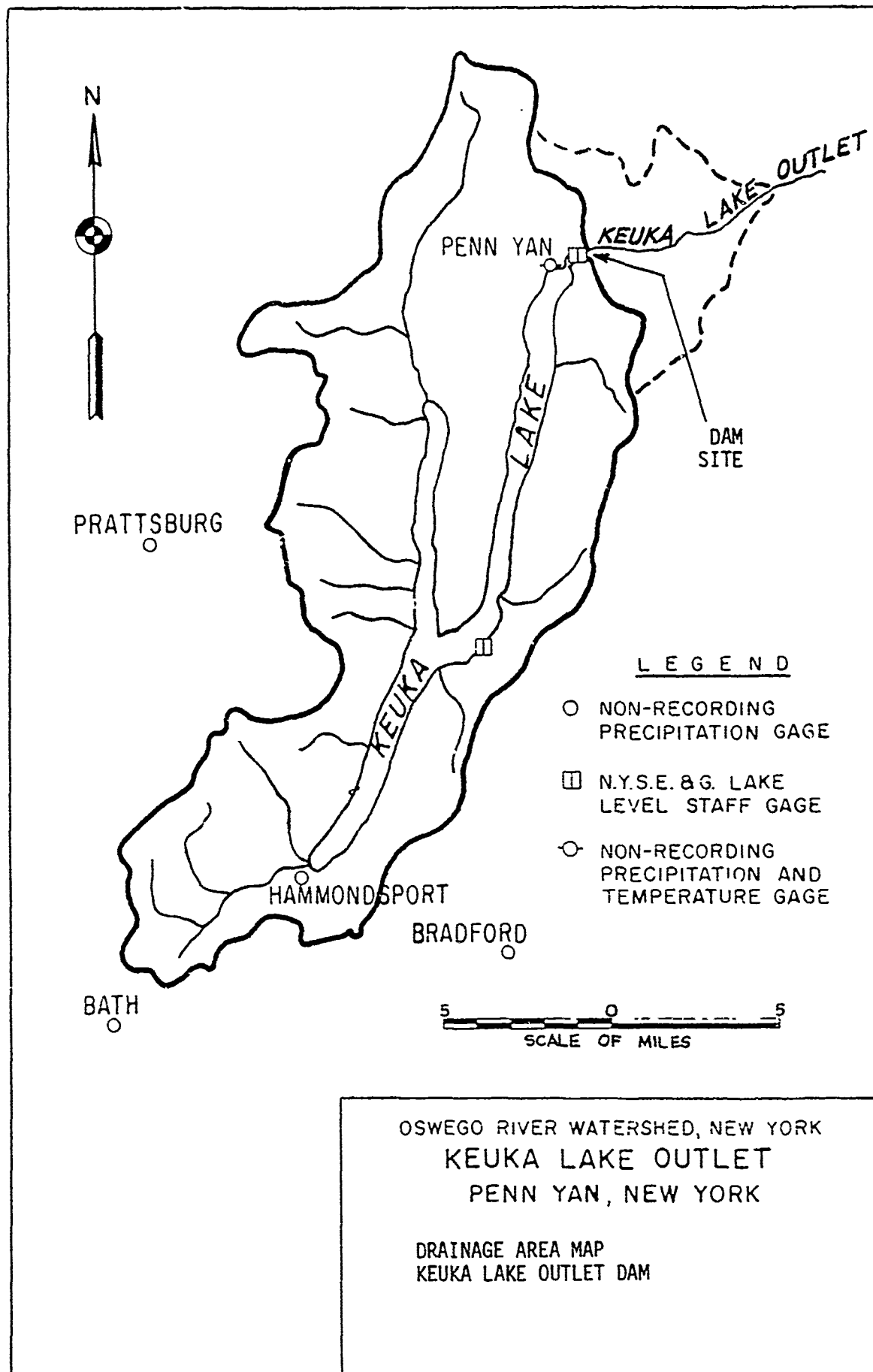
STREAMS TRIBUTARY TO LAKE ONTARIO

04232450 KEUKA INLET (KEUKA LAKE) AT HAMMONDSPORT, NY
(Formerly published as Keuka Lake at Hammondsport)

LOCATION.--Lat 42°24'22", long 77°13'08", Steuben County, Hydrologic Unit 04140201, on left bank of Keuka Inlet at end of Liberty Street extension at Hammondsport; and 300 ft (91 m) upstream from mouth.

DRAINAGE AREA.--Keuka Inlet 25.0 mi² (64.8 km²); Keuka Lake at mouth 182 mi² (471 km²).

PERIOD OF RECORD.--August 1960 to current year.

REVISED RECORDS.--WSP 2112: Drainage area. WRD NY 1974: 1973.

GAGE.--Water-stage recorder. Datum of gage is National Geodetic Vertical Datum of 1929. Prior to October 1, 1975, at datum 710.00 ft (216.408 m) higher.

REMARKS.--Lake regulated by village of Penn Yan; prior to July 1962, by New York State Electric and Gas Corp. Area of water surface, 18.3 mi² (47.4 km²). During each year, a large part of flow from 45.5 mi² (118 km²) of drainage area of Mud Creek (Susquehanna River basin) is diverted into Keuka Lake for power development. For table of diversion, see station 01528700.

EXTREMES FOR PERIOD OF RECORD.--Maximum elevation, 719.35 ft (219.258 m) June 24, 1972; minimum daily, 711.40 ft (216.835 m) Feb. 2, 3, 1961.

EXTREMES FOR CURRENT YEAR.--Maximum elevation, 715.15 ft (217.978 m) March 11; minimum, 712.65 ft (217.216 m) Feb. 18.

ELEVATION, IN FEET NGVD, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	713.08	713.18	713.21	712.86	713.51	712.87	714.50	714.24	714.42	714.40	714.55	713.77
2	713.11	713.15	713.19	713.26	713.40	712.90	714.48	714.20	714.42	714.40	714.61	713.76
3	713.07	713.15	713.16	713.33	713.25	712.98	714.50	714.14	714.42	714.41	714.65	713.82
4	713.06	713.15	713.16	713.34	713.20	713.16	714.44	714.10	714.41	714.40	714.58	713.82
5	713.07	713.14	713.16	713.35	713.15	713.53	714.47	714.06	714.41	714.39	714.49	713.81
6	713.03	713.15	713.13	713.36	713.10	714.69	714.41	714.02	714.42	714.36	714.45	714.13
7	713.03	713.17	713.10	713.35	713.10	714.92	714.42	713.98	714.41	714.35	714.32	714.23
8	713.03	713.17	713.09	713.38	713.10	715.02	714.40	713.97	714.42	714.34	714.25	714.18
9	713.01	713.16	713.15	713.35	713.10	715.04	714.48	713.97	714.49	714.32	714.19	714.09
10	712.98	713.18	713.13	713.37	713.05	715.08	714.57	713.98	714.49	714.31	714.10	714.00
11	712.99	713.19	713.10	713.30	713.00	715.10	714.67	714.00	714.51	714.30	714.07	713.95
12	712.99	713.22	713.07	713.20	712.90	715.07	714.75	714.00	714.53	714.32	713.99	713.88
13	713.07	713.19	713.03	713.10	712.85	715.03	714.73	714.01	714.50	714.32	713.91	713.79
14	713.19	713.18	713.00	713.05	712.85	715.02	714.79	714.02	714.48	714.32	713.86	713.79
15	713.20	713.20	712.97	713.00	712.80	715.01	714.80	714.03	714.46	714.33	713.85	713.84
16	713.21	713.21	712.95	713.00	712.75	714.97	714.80	714.05	714.45	714.39	713.85	713.78
17	713.19	713.20	712.93	713.00	712.70	714.92	714.79	714.07	714.45	714.41	713.80	713.72
18	713.16	713.23	712.93	713.00	712.65	714.89	714.78	714.08	714.45	714.40	713.80	713.65
19	713.17	713.24	712.90	713.05	712.70	714.85	714.75	714.07	714.43	714.38	713.80	713.62
20	713.18	713.26	712.87	713.05	712.75	714.80	714.71	714.07	714.40	714.37	713.79	713.52
21	713.16	713.26	712.88	713.10	712.80	714.77	714.68	714.08	714.35	714.36	713.79	713.47
22	713.16	713.25	712.95	713.20	712.90	714.74	714.65	714.11	714.36	714.34	713.77	713.46
23	713.17	713.23	712.84	713.30	713.00	714.71	714.61	714.10	714.40	714.34	713.74	713.38
24	713.17	713.25	712.81	713.37	712.92	714.69	714.56	714.16	714.38	714.39	713.74	713.31
25	713.13	713.26	712.90	713.29	712.36	714.70	714.50	714.23	714.37	714.40	713.75	713.29
26	713.15	713.26	712.88	713.47	712.85	714.68	714.45	714.24	714.33	714.40	713.75	713.28
27	713.20	713.25	712.85	713.51	712.86	714.64	714.42	714.26	714.29	714.42	713.81	713.28
28	713.19	713.27	712.83	713.53	712.86	714.58	714.39	714.29	714.33	714.40	713.81	713.31
29	713.20	713.26	712.80	713.52	---	714.55	714.35	714.32	714.34	714.41	713.79	713.35
30	713.18	713.24	712.76	713.52	---	714.55	714.29	714.37	714.35	714.39	713.80	713.36
31	713.16	---	712.74	713.51	---	714.53	---	714.40	---	714.39	713.80	---
MEAN	713.12	713.21	712.98	713.26	712.96	714.55	714.57	714.12	714.42	714.37	714.01	713.69
MAX	713.21	713.27	713.21	713.53	713.51	715.10	714.80	714.40	714.53	714.42	714.65	714.23
MIN	712.98	713.14	712.74	712.86	712.65	712.87	714.29	713.97	714.29	714.30	713.74	713.28

CAL YR 1978   MEAN 714.04   MAX 716.26   MIN 712.74
WTR YR 1979   MEAN 713.78   MAX 715.10   MIN 712.65

SUSQUEHANNA RIVER BASIN

01528700 DIVERSION FROM WANETA LAKE TO KEUKA LAKE AT KEUKA, NY

LOCATION.--Lat 42°29'06", long 77°06'39", Steuben County,
Hydrologic Unit 02050105, at entrance to conduit on
Diversion Canal, 0.8 mi (1.3 km) east of Keuka, and
1.0 mi (1.6 km) north of Wayne.

DRAINAGE AREA.--45.5 mi² (118 km²).

PERIOD OF RECORD.--October 1966 to current year.

GAGE.--Daily power generation records.

REMARKS.--Records for January 1951 to September 1966
on file. Sketch indicates diversion from Lamoka-
Waneta Lakes (Susquehanna River Basin) to Keuka Lake
(Oswego River Basin).

COOPERATION.--Records furnished by New York State
Electric and Gas Corp.

AVERAGE DISCHARGE.--13 years, 24.0 ft³/s (0.680 m³/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 73
ft³/s (2.07 m³/s) June 23, 1972; no flow for many
days each year.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 66 ft³/s
(1.87 m³/s) Oct. 11, 12; no flow many days.
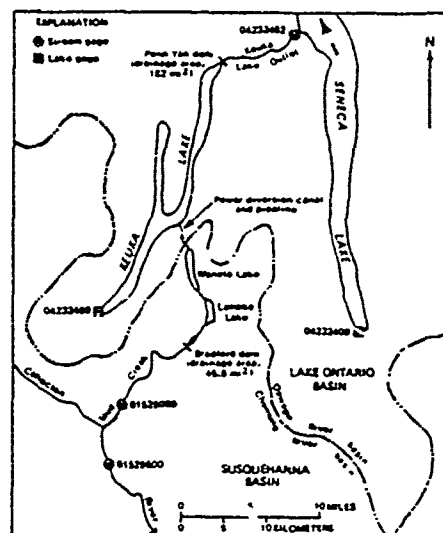
Figure 8.--Gaging stations and transbasin
diversion, Cohocton River-Keuka Lake area.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.00	31	.00	.00	.00	.00	.00	26	.00	.00	.00
2	.00	.00	31	23	.00	.00	.00	.00	.00	.00	.00	.00
3	.00	.00	31	48	.00	.00	.00	.00	.00	32	.00	.00
4	.00	.00	31	55	.00	.00	.00	.00	.00	36	.00	.00
5	.00	.00	.00	55	.00	.00	.00	.00	.00	.00	.00	.00
6	.00	32	20	55	<.00	.00	.00	.00	.00	.00	.00	.00
7	.00	55	33	55	.00	.00	.00	.00	.00	.00	.00	.00
8	.00	55	33	23	.00	.00	.00	.00	.00	.00	.00	.00
9	.00	55	32	.00	.00	.00	.00	5.2	.00	.00	.00	.00
10	33	55	.00	.00	.00	.00	.00	14	.00	.00	.00	.00
11	66	55	19	.00	.00	.00	.00	8.0	.00	.00	.00	.00
12	66	55	33	.00	.00	.00	.00	.00	.00	.00	.00	.00
13	51	55	33	.00	.00	.00	.00	.00	.00	.00	.00	.00
14	46	48	33	.00	.00	.00	.00	24	.00	.00	.00	.00
15	46	42	34	.00	.00	.00	.00	49	.00	.00	.00	.00
16	27	42	34	.00	.00	.00	.00	55	.00	.00	.00	.00
17	.00	37	34	.00	.00	.00	.00	55	.00	15	.00	.00
18	.00	37	34	.00	.00	.00	.00	35	.00	.00	.00	.00
19	.00	37	34	.00	.00	.00	.00	.00	.00	.00	.00	.00
20	.00	35	33	.00	.00	.00	.00	.00	.00	.00	.00	.00
21	.00	35	33	.00	.00	.00	.00	31	.00	.00	.00	.00
22	.00	16	34	.00	.00	.00	.00	55	.00	.00	.00	.00
23	.00	.00	34	.00	.00	.00	.00	55	.00	.00	.00	.00
24	.00	.00	34	.00	.00	.00	.00	55	.00	.00	.00	.00
25	.00	.00	34	.00	.00	.00	.00	28	.00	.00	.00	.00
26	.00	.00	34	.00	.00	.00	.00	.00	.00	.00	.00	32
27	.00	18	34	.00	.00	.00	.00	.00	.00	.00	.00	49
28	.00	34	34	.00	.00	.00	.00	.00	.00	.00	.00	55
29	.00	34	34	.00	---	.00	.00	24	.00	.00	.00	55
30	.00	34	34	.00	---	.00	.00	42	.00	.00	.00	55
31	.00	---	34	.00	---	.00	---	42	---	.00	.00	---
TOTAL	335.00	866.00	936.00	314.00	.00	.00	.00	577.20	26.00	83.00	.00	246.00
MEAN	10.8	28.9	30.2	10.1	.000	.000	.8.0	18.6	.87	2.68	.000	8.20
MAX	66	55	34	55	.00	.00	.00	55	26	36	.00	55
MIN	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

CAL YR 1978 TOTAL 10772.00   MEAN 29.5   MAX 68   MIN .00
WTR YR 1979 TOTAL   3383.20   MEAN 9.27 MAX 66   MIN .00

KEUKA LAKE OUTLET DAM
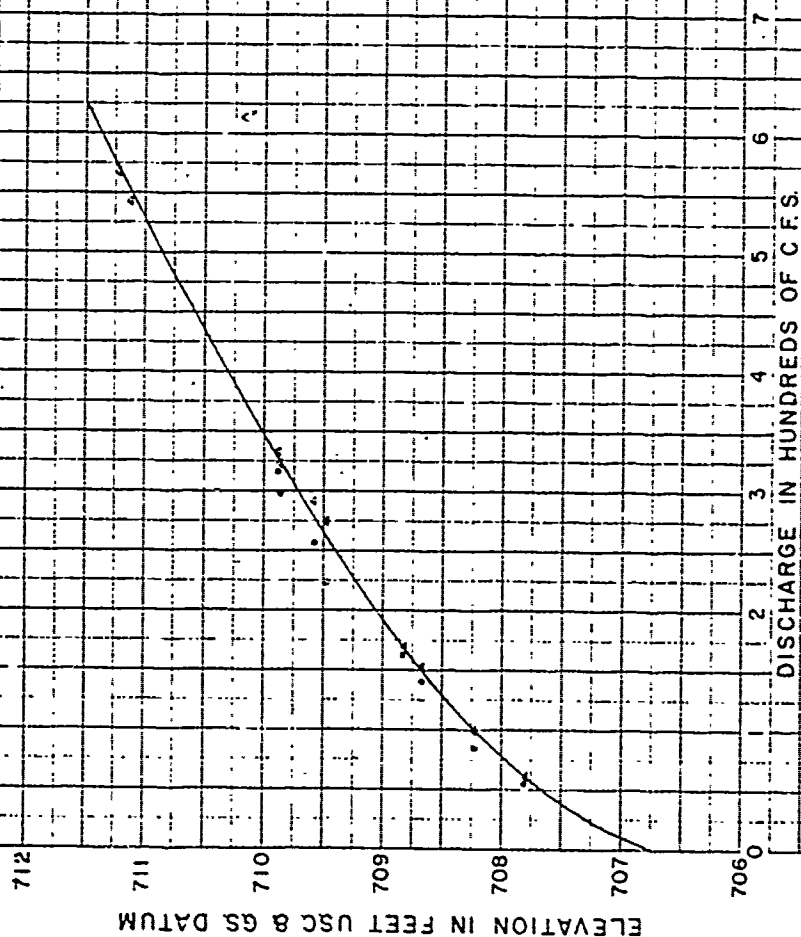
NY-390

ELEVATION IN FEET USC & GS DATUM

712
711
710
709
708
707
706.0

DISCHARGE IN HUNDREDS OF C.F.S.

2   3   4   5   6   7

KEUKA LAKE DAM NY-390

1980 RULE CURVE* FOR LAKE

* SOURCE - OLONER

This afternoon the new dam gates were put into operation. These new gates are located in a brick and steel wall across the south channel. ████████ ████████. Each gate opening is 54" wide and 54" high over which is fitted a cast iron gate lifted by a worm gear and cap screw mechanism. Thus these gates can be opened from the bottom any desired amount up to the top of the opening. The capacity for flow is exactly the same as for the old gates and is based upon the height setting of each gate and the pressure created by the lake level. For the present each gate is about 12" open which will permit moderate flow. Very soon they will be opened fully to permit maximum runoff during the spring rise period. At the same time, the gate in the north channel which is now restricted in flow by the conduit under the construction work access will be fully opened too.

In summary, the gates in the north and south channel are now both in good condition and will be operated to minimize spring fillup. The target level for June 1st is slightly above 714.0 to be maintained as nearly as possible thereafter until mid-September.

March 2nd, 1966
JT Andrews/hst

APPENDIX D
REFERENCES

APPENDIX D

REFERENCES

1) M.G. Cline and R.L. Marshall, General Soil Map of New York State, Cornell University Agriculture Experiment Station, March 1977.

2) P. Greeson and F. Robison, Characteristics of New York Lakes-Gazetteer, Part 1, Bulletin 68, US Geological Survey, 1970.

   Y.W. Isachsen and W.G. McKendree, Brittle Structures Map of New York State, New York State Museum, 1977.

4) H.W. King and E.F. Brater, Handbook of Hydraulics, 5th edition, McGraw-Hill, 1963.

5) University of the State of New York, Geology of New York, Education Leaflet 20, Reprinted 1973.

   U.S. Army; Corps of Engineers; Buffalo District:

6)   Keuka Outlet at Penn Yan, New York, Detailed Project Report for Flood Control, June 1960.

7)   Oswego River Basin, Water Resources Management Study, Preliminary Feasibility Report Appendices, May 1978.

8) U.S. Department of Commerce; Weather Bureau; Hydrometeorological Report No. 33: Seasonal Variation of the Probable Maximum Precipitation East of the 105th Meridian for Areas from 10 to 1,000 square miles and durations of 6, 12, 24, and 48 hours; April 1956.

9) U.S. Department of Commerce; NOAA: Hydrometeorological Report No. 51: Probable Maximum Precipitation Estimates, United States East of the 105th Meridian; June 1978.

10) U.S. Geological Survey; Water Resources Data for New York - Water Year 1979, Water Data Report NY-79-1, Volume 1, May 1980.

APPENDIX E
DRAWINGS

KEUKA LAKE OUTLET DAM

NY - 390

CONTROL WORKS

PENN YAN

LIBERTY ST.

DELANO PL.

BIRKET ST.

KEUKA

KEUKA LAKE
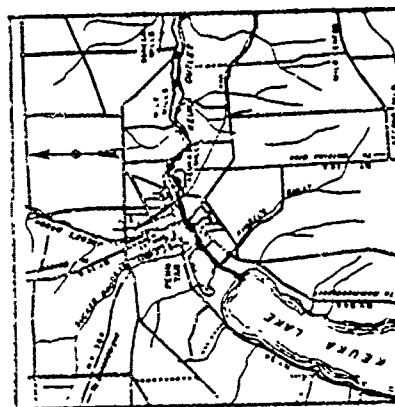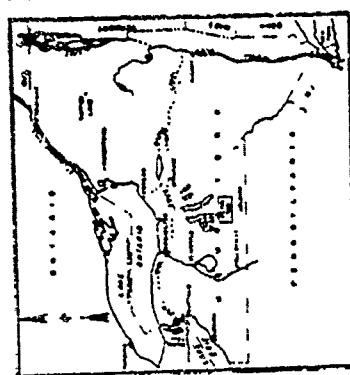
PLAN
Scale 1"=300'

MINOR FLOOD CONTROL PROJECT
KEUKA OUTLET AT PENN YAN, NEW YORK

GENERAL MAPS

SCALE AS SHOWN

U.S. ARMY ENGINEER DISTRICT, BUFFALO

VICINITY MAP

LOCATION MAP

KEUKA LAKE

PENN YAN

PLATE I
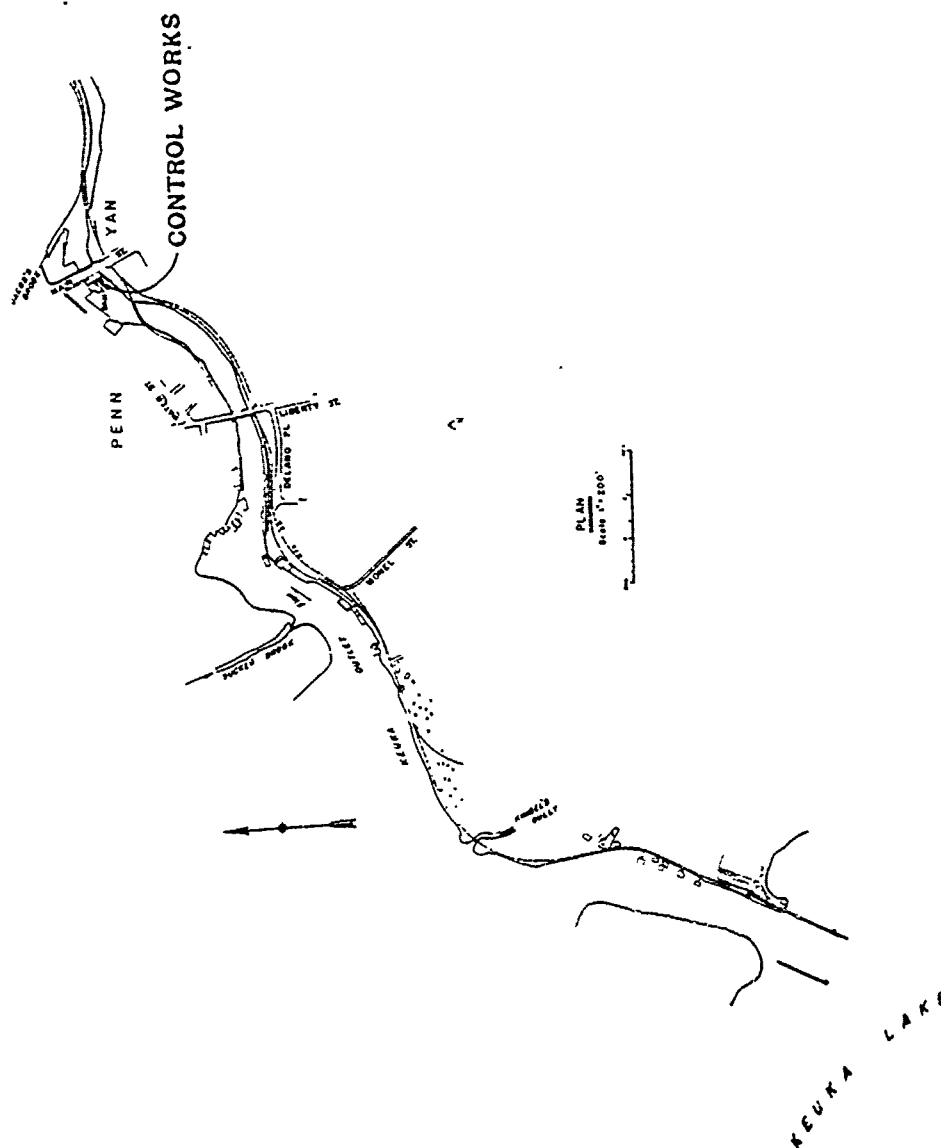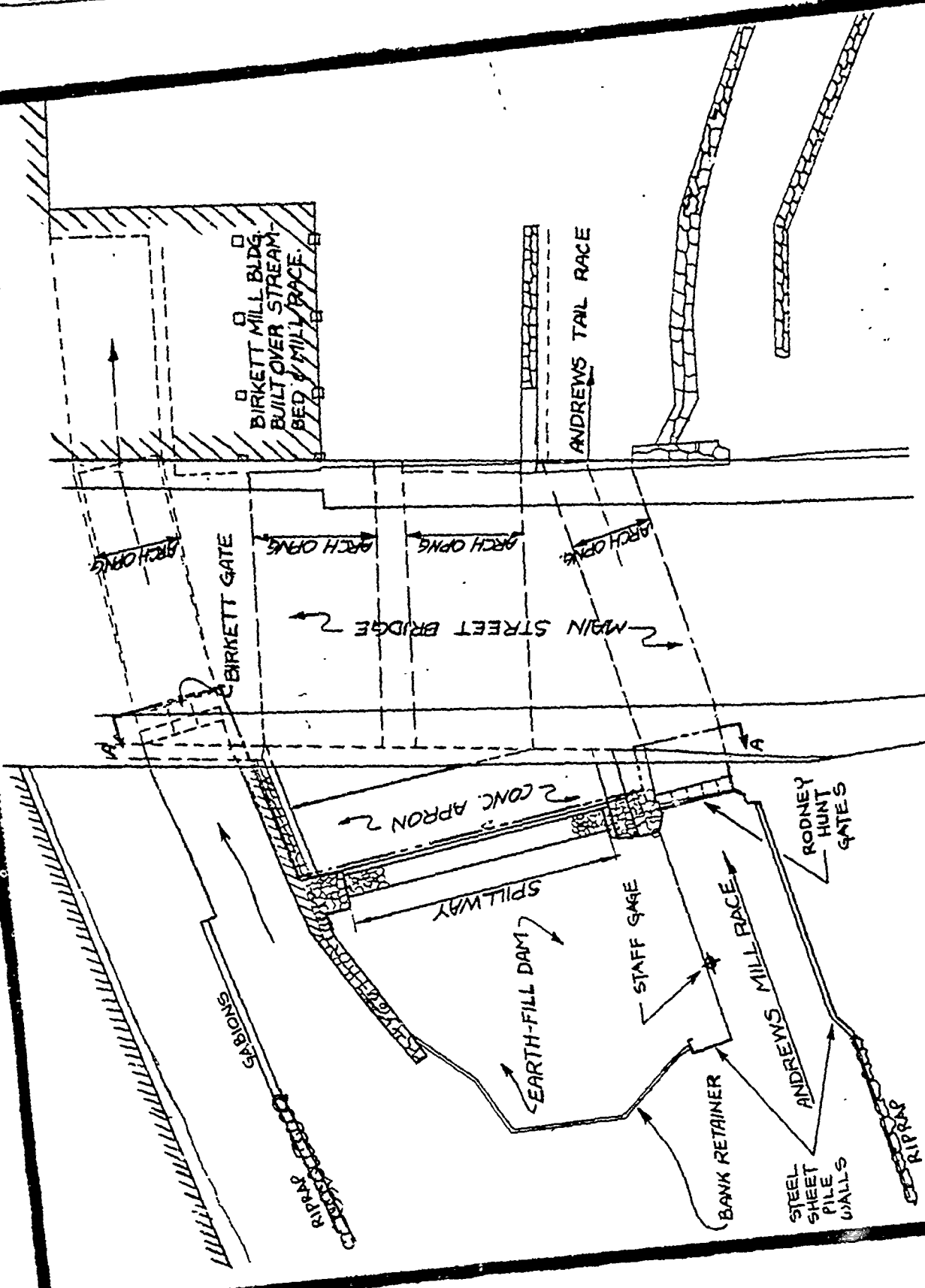
PLAN OF CONTROL STRUCTURE AREA

MAY-1980

KEUKA LAKE DAM
NY-390

Labels within the figure:

- BIRKETT MILL BLDG. BUILT OVER STREAM-BED of MILL RACE.
- ANDREWS TAIL RACE
- ARCH OPNG
- ARCH OPNG
- ARCH OPNG
- ARCH OPNG
- BIRKETT GATE
- MAIN STREET BRIDGE
- A
- A
- CONC. APRON
- RODNEY HUNT GATES
- SPILLWAY
- STAFF GAGE
- ANDREWS MILL RACE
- EARTH-FILL DAM
- GABIONS
- BANK RETAINER
- STEEL SHEET PILE WALLS
- RIPRAP
- RIPRAP

SECTION A-A

BURKETT GATE

EL.732.0
EL.718±
EL.709.0

4.0' x 5.4' OPNG

15.8'

EL.719±

SPILLWAY 52.8'

EL.716.04

CONCRETE APRON EL.709.0

EL.719±

RODNEY HUNT GATES

4.5' x 4.5' OPNG

4.5' x 4.5' OPNG

15.7'

EL.732.0
EL.718.1
EL.708.45

KEUKA LAKE OUTLET
PENN YAN, NEW YORK
MAIN STREET DAM AND
CONTROL GATES

MAY - 1980

KEUKA LAKE DAM
NY-390

3"

ELEV 719.00

1'X6" GRATING RECESS

1'-0"

KEY
DEEP x 4" WIDE

12 WF 45

2'-6"

12-3/16"

2½" CLEAR

2½" CLEAR

TOP GATE OPENING
ELEV. 712.93
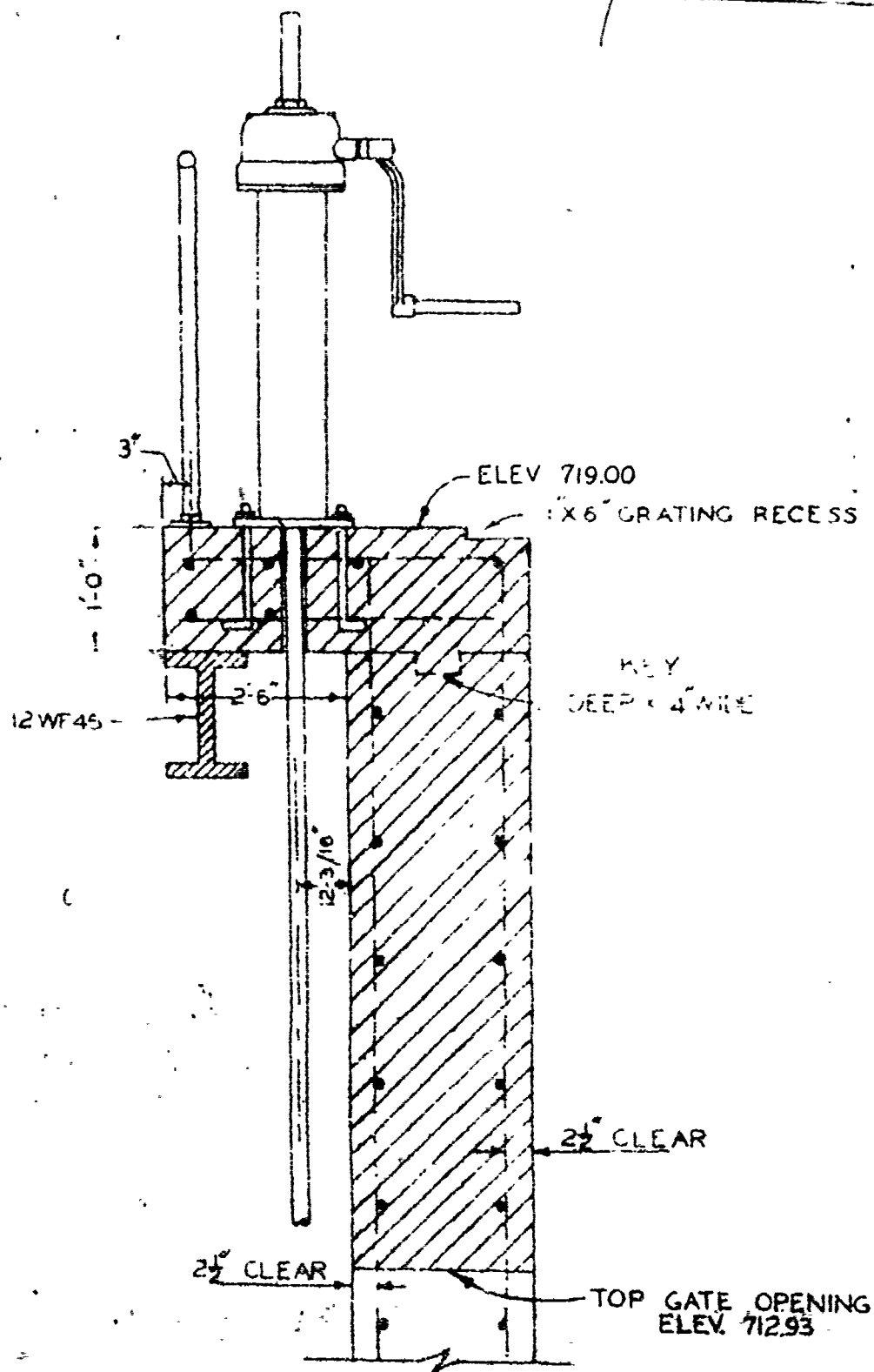
WALL SECTION
NO SCALE

KEY 3" DEEP x 4" WIDE

COPPER WATER STOP

12"

7' 10"   15' 8"

EXISTING SILL

12 WF 45

CHANNEL
WALL

RETICULATED
GRATING
1" x 3/16"
BEARING BARS
1-1/8" OPENING

EXIST
MASONRY
WALL

4' 6"   TOP OF DAM

○   ○

12 WF 45

MIN.
8" BEARING

FRONT FACE C
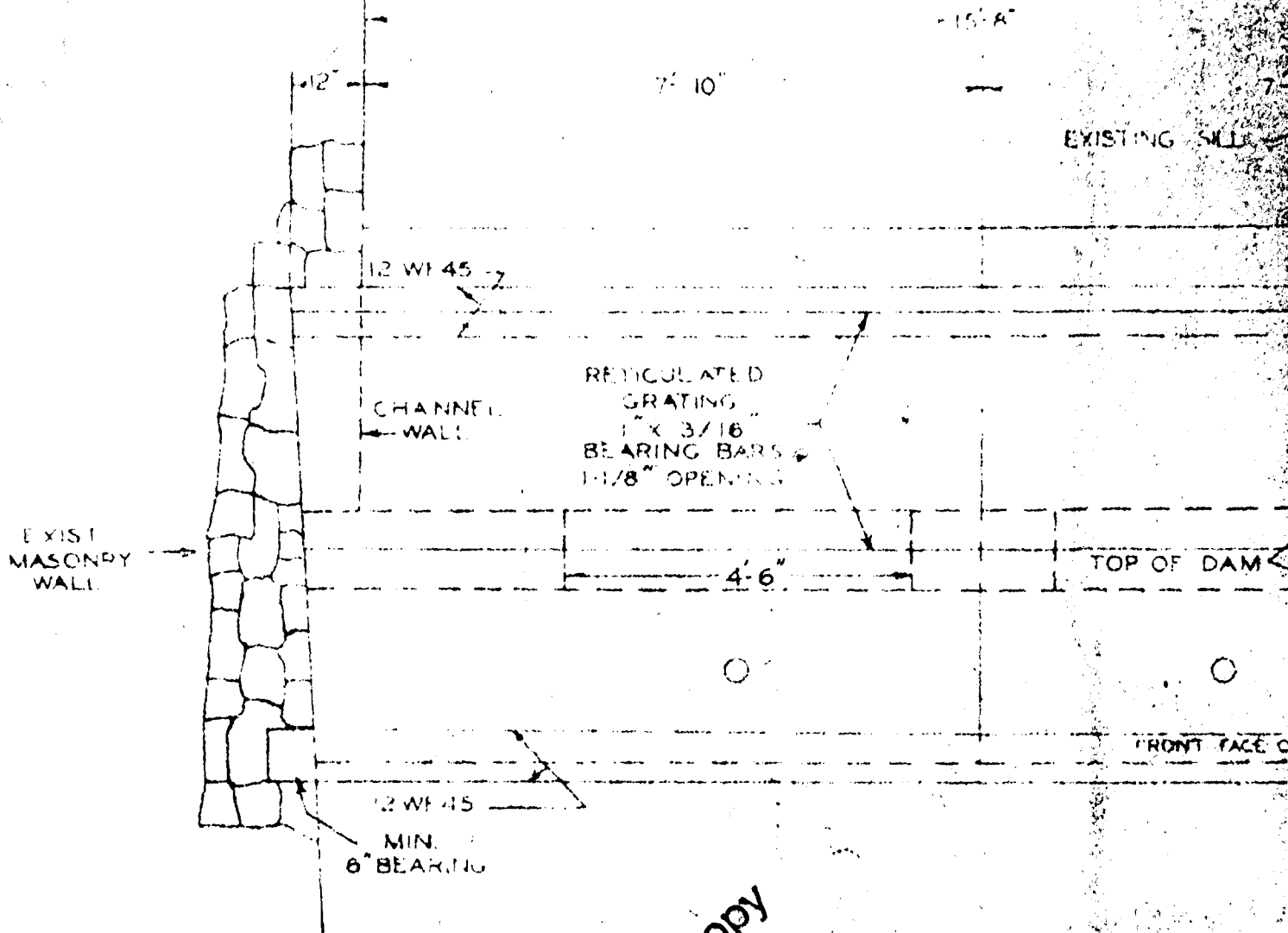
PLAN
HANDRAIL NOT SHOWN
NO SCALE

ELEV. 708.38

TOP OF FOOTING

EXIST BRIDGE

7'8"

SILL

LANDING

2-4"

CHANNEL WALL

EXIST MASONRY WALL

DAM

N.W.L.

FACE OF FOOTING

MIN 6" BEARING

4'-1"

5'

A

6"
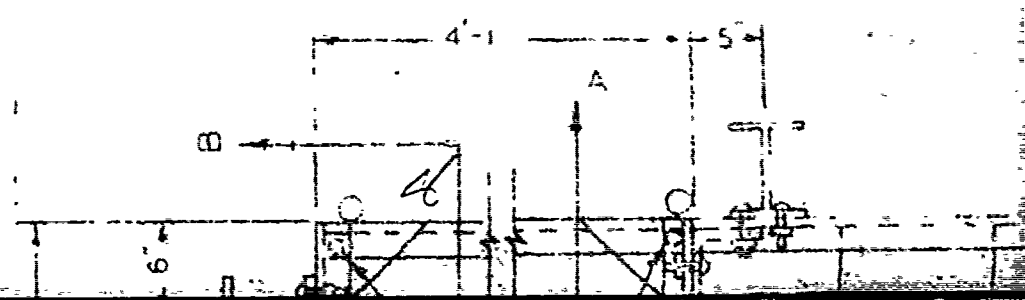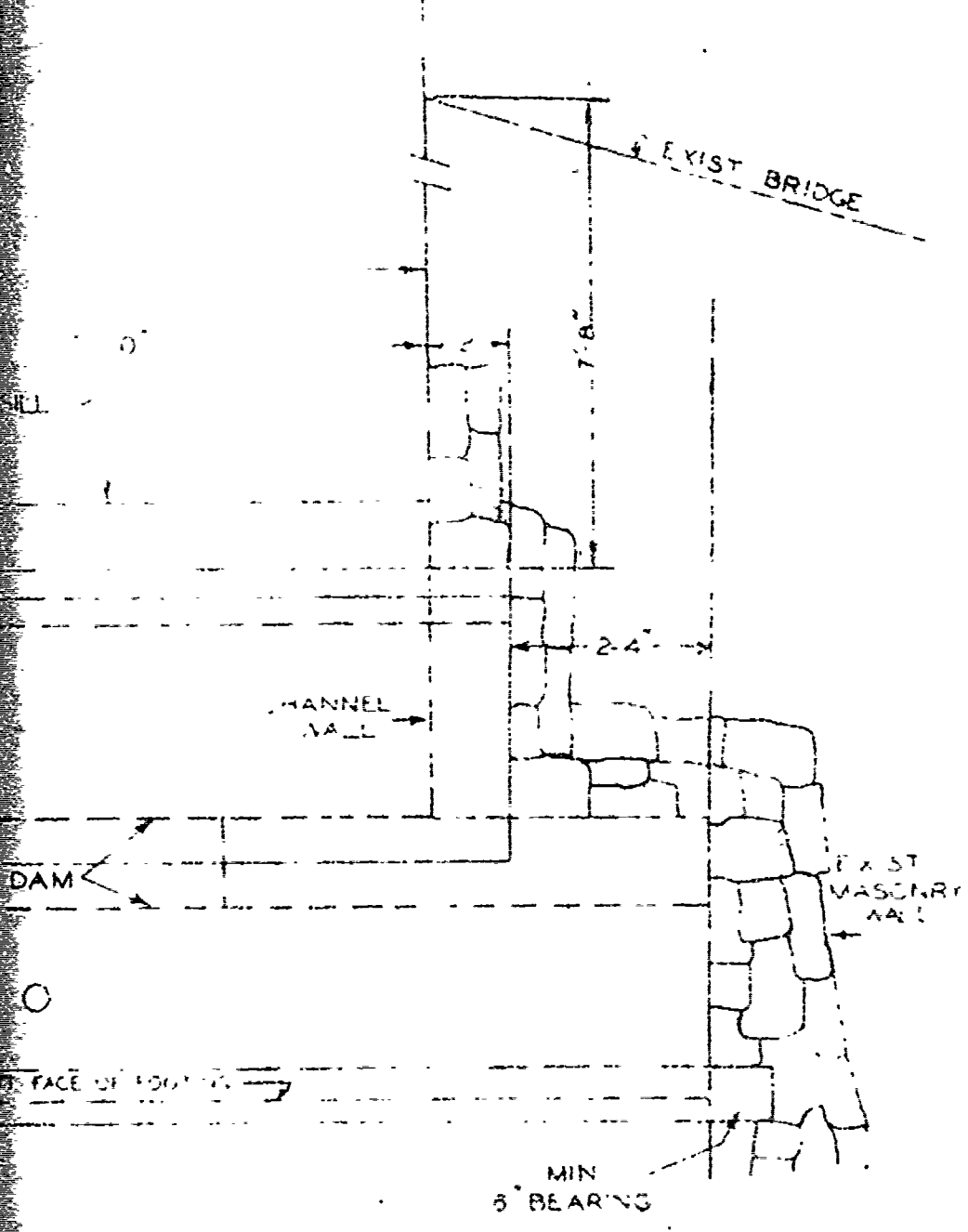
REMOVE 8" EXISTING BRIDGE RAIL. PLACE NEW
2 RAIL 1 1/4" PIPE RAILING FROM NORTH END OF
EXISTING RAIL TO SOUTH END LANDING. PROVIDE
PROTECTIVE BARRIER ACROSS OPENING DURING
CONSTRUCTION.

EXISTING BRIDGE

DOWN

LANDING
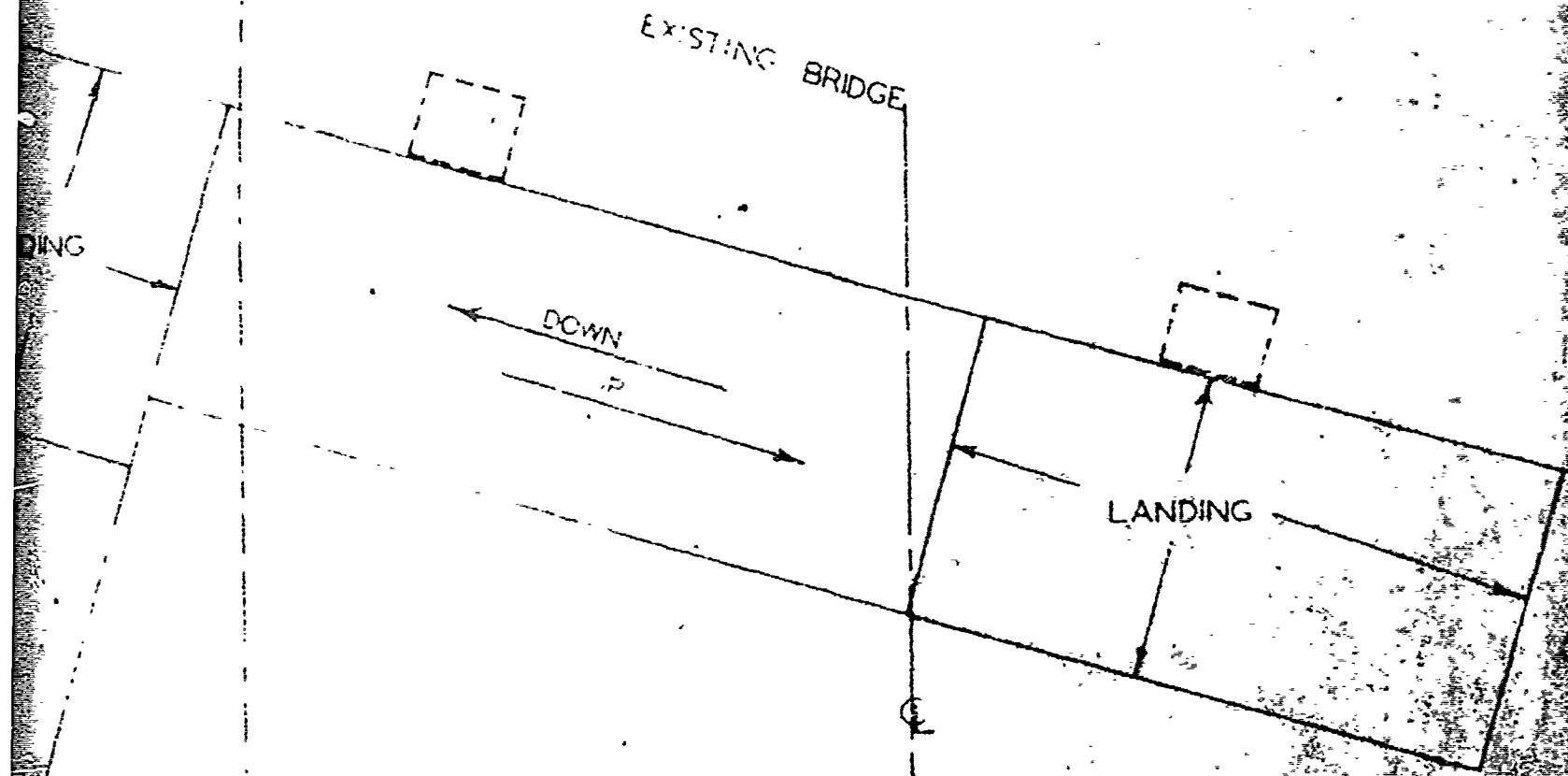
STAIRWAY
PLAN
SCALE: 1/2 IN = 1 FT

3'-6"

2'-8"

A

9

6

COPPER WATER STOP
2" CLEAR

2'-3"

3" CLEAR

BOT. GATE OPENING
ELEV 708.43

COPPER WATER STOP

CONST. JT.
ELEV. 708.43

KEY 3 DEEP

1'-0"

3" CLEAR

2'-0"

6"

UPPER
2" CLEAR

3" CLEAR

1'-0"

8'-8"

FOOTING SECTION
NO SCALE

1'-0"

SECTION D-D

ALL REINFORCING BARS ARE NO. 4 ON 12 IN. CENTERS
SEE SPECIFICATIONS FOR REINFORCING BAR SCHEDULE

3" CLEAR

3" CLEAR

GRATING
RECESS

3'-0"

3'-0"

1'-0"

RETICUL
GRAT

ELEV. 708.38

OVERLAP
4C N

TP

HANDRAIL

3"

ELEV.
712.93

ELEV. 708.43

EXISTING
MASONRY
WALL

D
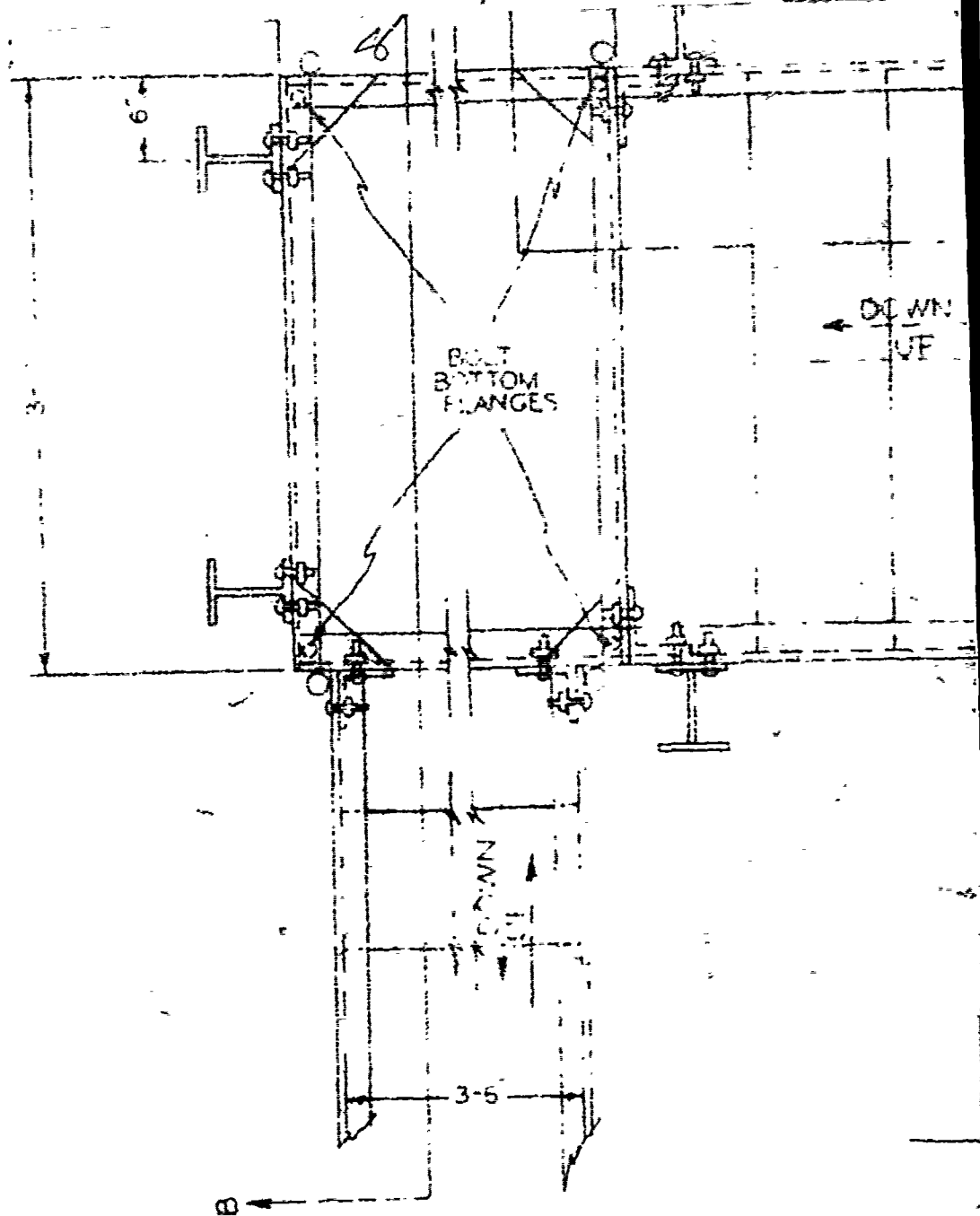
PROPOS

TION

BOLT
BOTTOM
FLANGES

DOWN
UP

3'-6"

3'

6"

B

3-5

PLAN
LOWER LANDING
FLOOR PLATE NOT SHOWN
SCALE 1 IN = 1 FT

DRILL FOR 1" BOLTS AT 2' SPACING

3 x 3 x ½ Ls
BACK TO BACK

UP

G

6 I 17.5
9'0" LONG

DOWN
UP

3'-6"

1" INLAND 4 WAY
SAFETY PLATE
OR EQUIV.
10" X 42" W/ FLANGES

4"X4" L
1"X4"

1" R 6X8 Δ
4 FIELD WELD

10 C 20

12 C 20.7

ELEV
727.9

FLOOR R
INLAND 4 WAY
OR EQUIV.

6 I 17.5
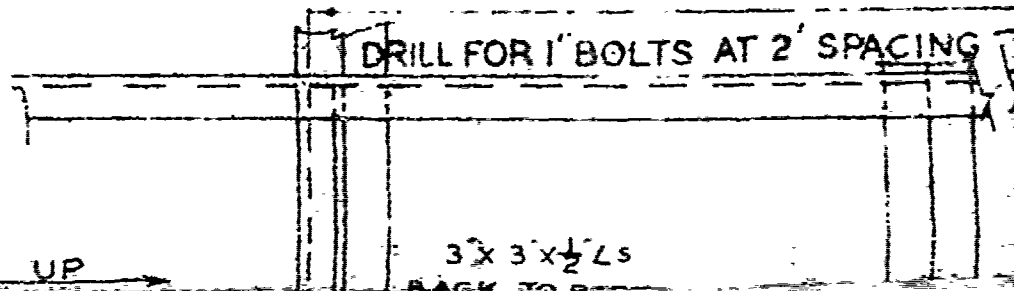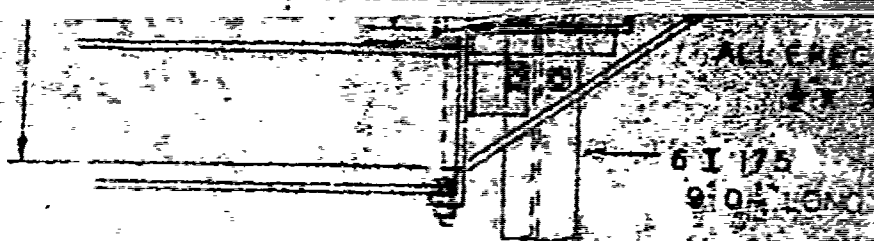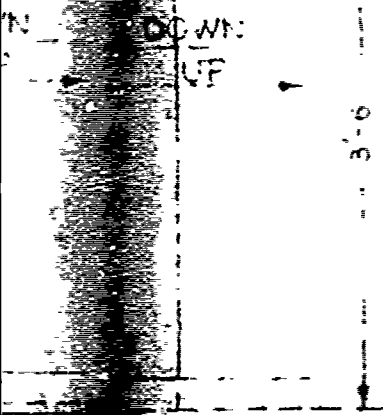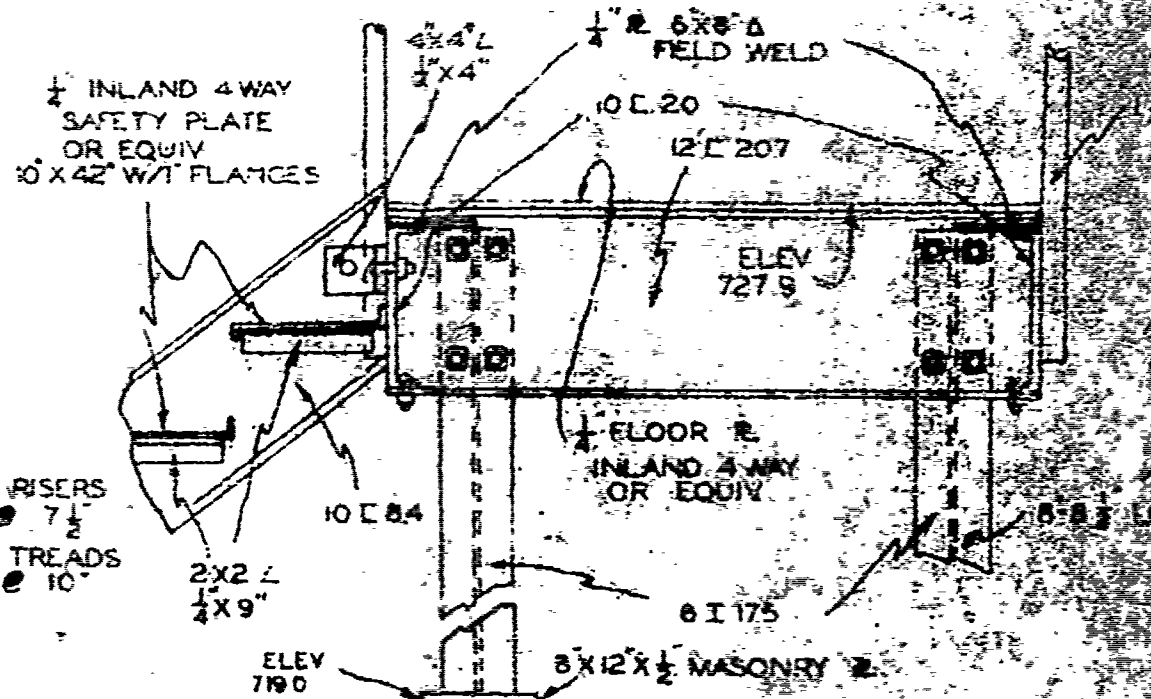
14 RISERS
@ 7 1/2"
13 TREADS
@ 10"

10 C 8.4

2X2 L
1/4 X 9"

ELEV
719.0

8 X 12 X 1/2" MASONRY R

4"X 4 X 1/4"
MASONRY R
ELEV 719.0

ELEV
735.4

1" FLOOR R
INLAND 4 WAY
OR EQUIV.

10 C 20

12 C 20.7

6x6X 1/2 L
6" LONG

DOWN

6'-11"

BRACING

3X3X1/4 L
BACK TO BACK

WELD ALL CONNECTIONS

3" CLEAR

3" CLEAR

3" CLEAR

2½" CLEAR

2½" CLEAR

GRATING RECESS
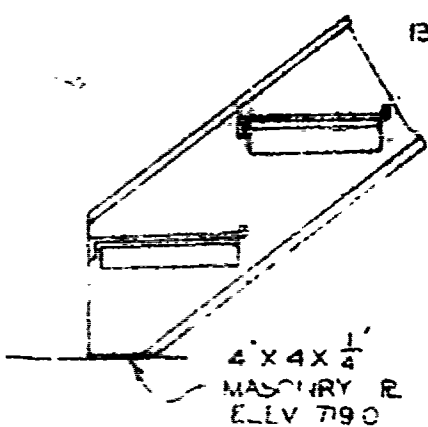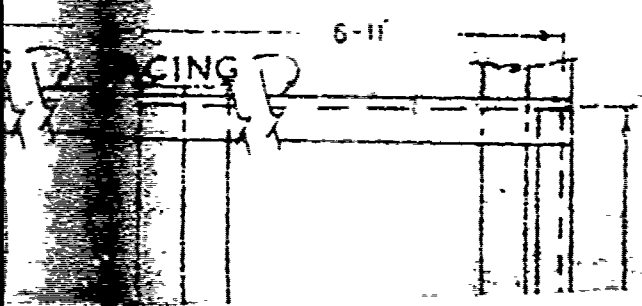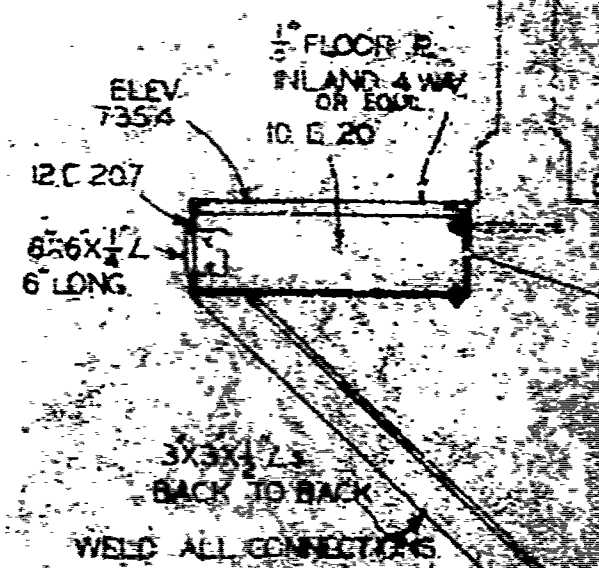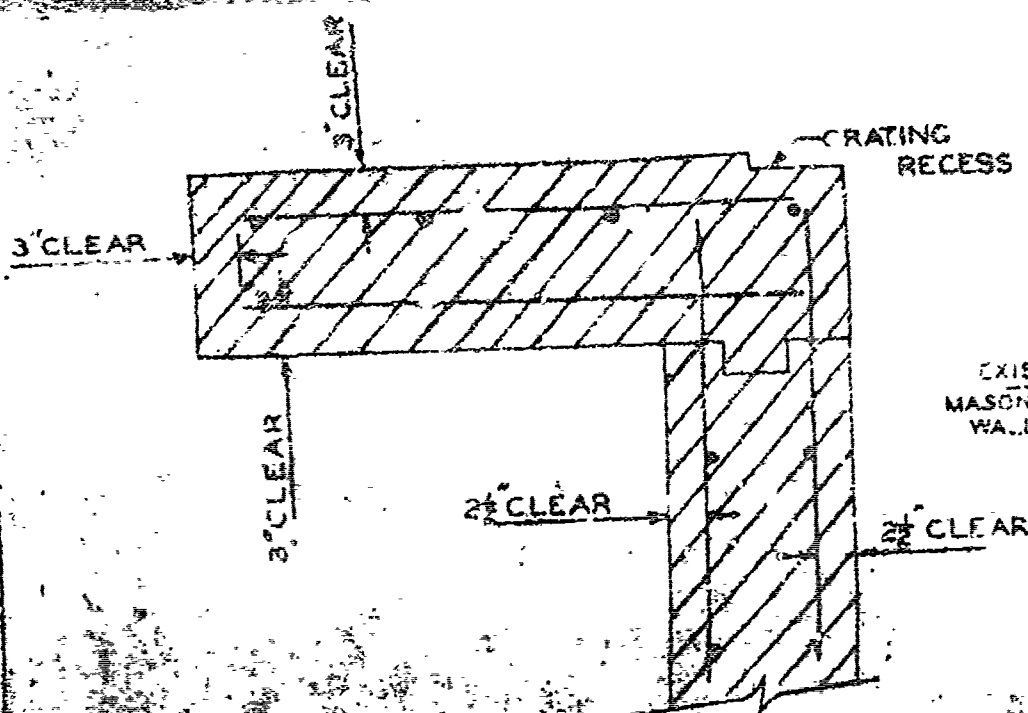
REINFORCING PLAN
SCALE: 1 IN. = 1 FT.

EXIST
MASONRY
WALL

12 WF 45

DAM

RETIC
GR

TO
CHA
WA

3 CL

3'-0"

3'-0"

1'-0"
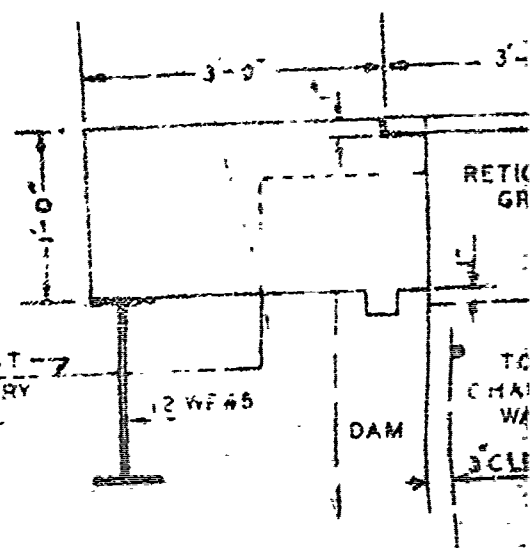
SECTION OF
NORTH CHANNEL
FACING NORTH
NO SCALE

COPPER WATER STOP

KEY 3 DEE

ELEV. 708.43

3'-0"

EXISTING
MASONRY
WALL

ETIC
GRA

TOP
HAN
WALL

2 W 4

CLE

3" CLEAR

D
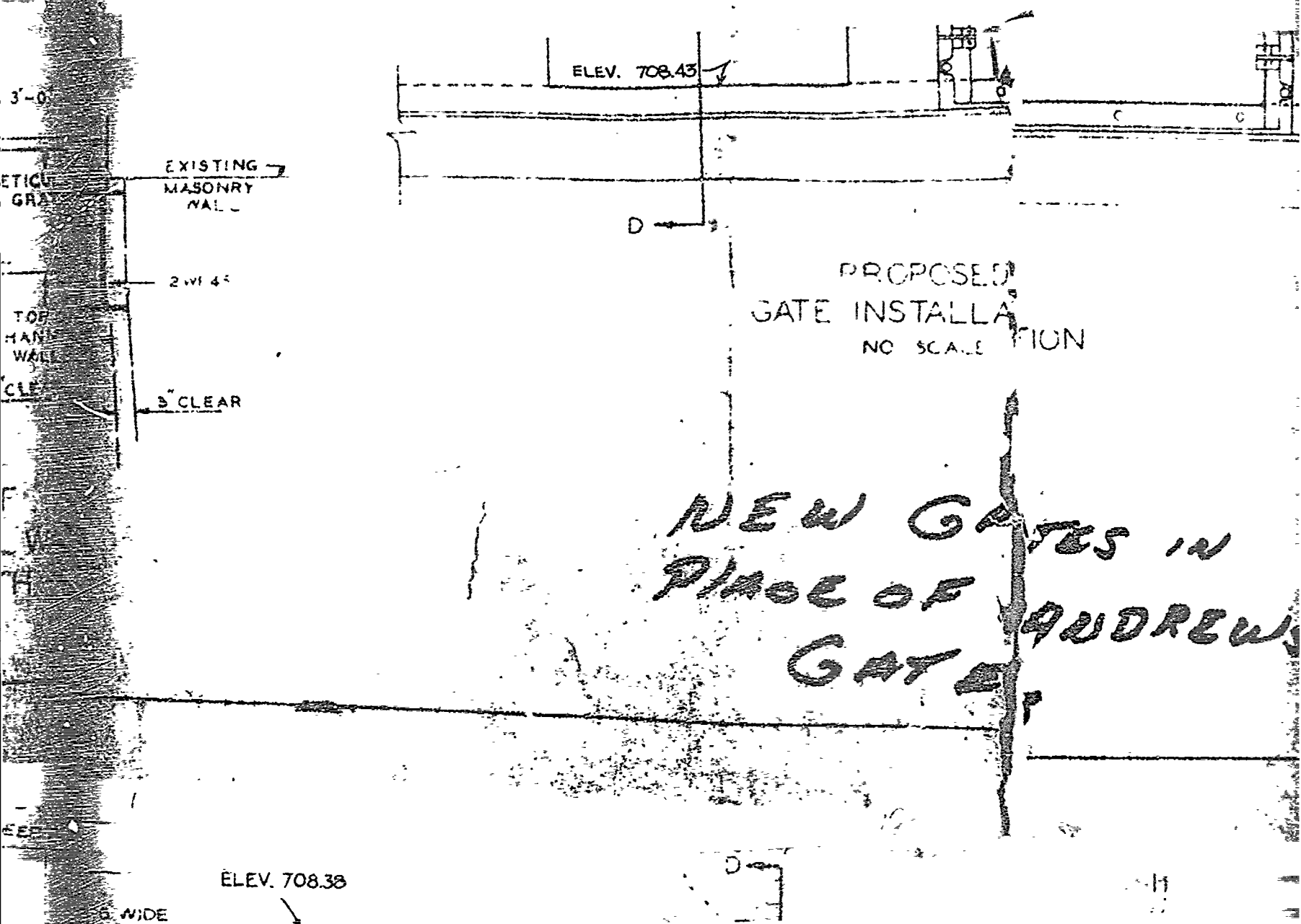
PROPOSED
GATE INSTALLATION
NO SCALE

NEW GATES IN
PLACE OF ANDREWS
GATE

ELEV. 708.38

6. WIDE

D

H

PLAN
LOWER LANDING
FLOOR PLATE NOT SHOWN
SCALE 1IN=1FT

DRILL FOR 1" BOLTS AT 2' SPACING

UP

DOWN
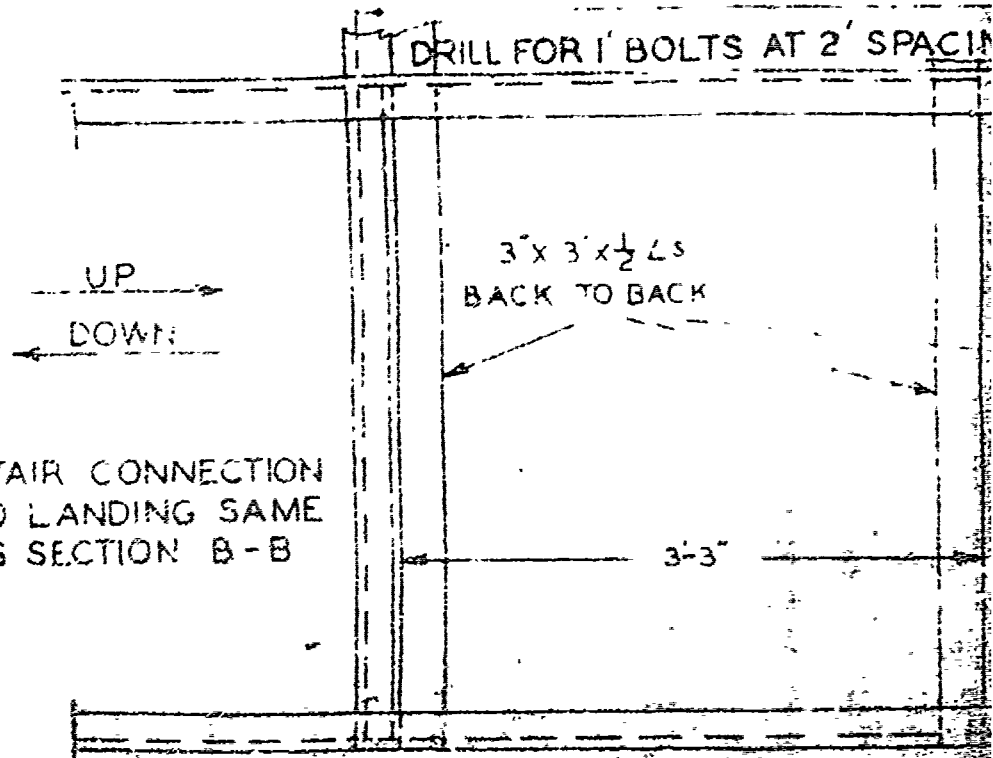
3"x 3"x ½ ∠s
BACK TO BACK

STAIR CONNECTION
TO LANDING SAME
AS SECTION B-B

3'-3"

PLAN UPPER L
FLOOR PLATE NOT
SCALE 1IN=1

DREWS

N

NDING
NOT SHOWN
IN · IF T

CINC

AT 2' SPACING

6-11

3'-6"

12 C 20.7

6X6X¼"L
6" LONG

3X3X½"Ls
BACK TO BACK

WELD ALL CONNECTIONS

4X4X
6'-8 LO
DRILL FO
40/8

PLAN FOR THE
RECONSTRUCTION OF GATES AND STRUCTU
ON THE SOUTH BRANCH OF KEUKA LAKE O
AT MAIN STREET BRIDGE IN
PENN YAN, NEW YORK
SCALE: AS SHOWN   SHEET 2 OF 2
NOVEMBER 18, 1985   REVISED

Owen C.

NYS LIC PE No. 80

UPPER LANDING
PLATE NOT SHOWN
SCALE 1 IN = 1 FT.
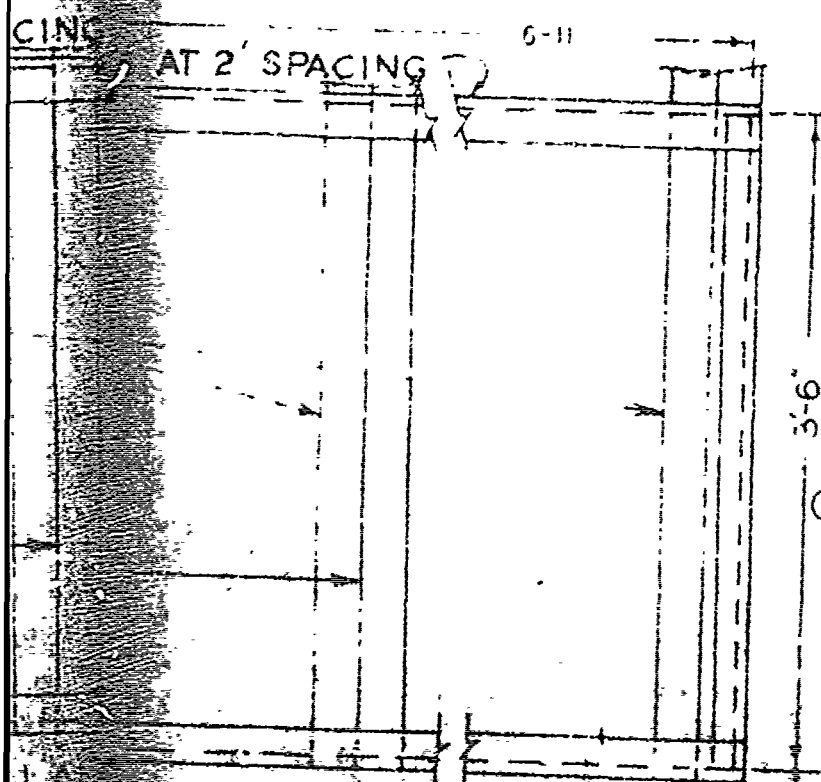
12 C 20.7

6X6X1/4 L
6" LONG

3X3X1/2 Ls
BACK TO BACK

WELD ALL CONNECTIONS

EXIST. S.W.

4X4X1/2 L
6'-8" LONG
DRILL FOR 1" BOLTS
4@18" SPACING

PLAN FOR THE
...TION OF GATES AND STRUCTURES
... BRANCH OF KEUKA LAKE OUTLET
... MAIN STREET BRIDGE IN
PENN YAN, NEW YORK
SCALE AS SHOWN SHEET 2 OF 2
NOVEMBER 18, 1965 REVISED NOV. 22, 1965

NYS LIC. PE LS 0500
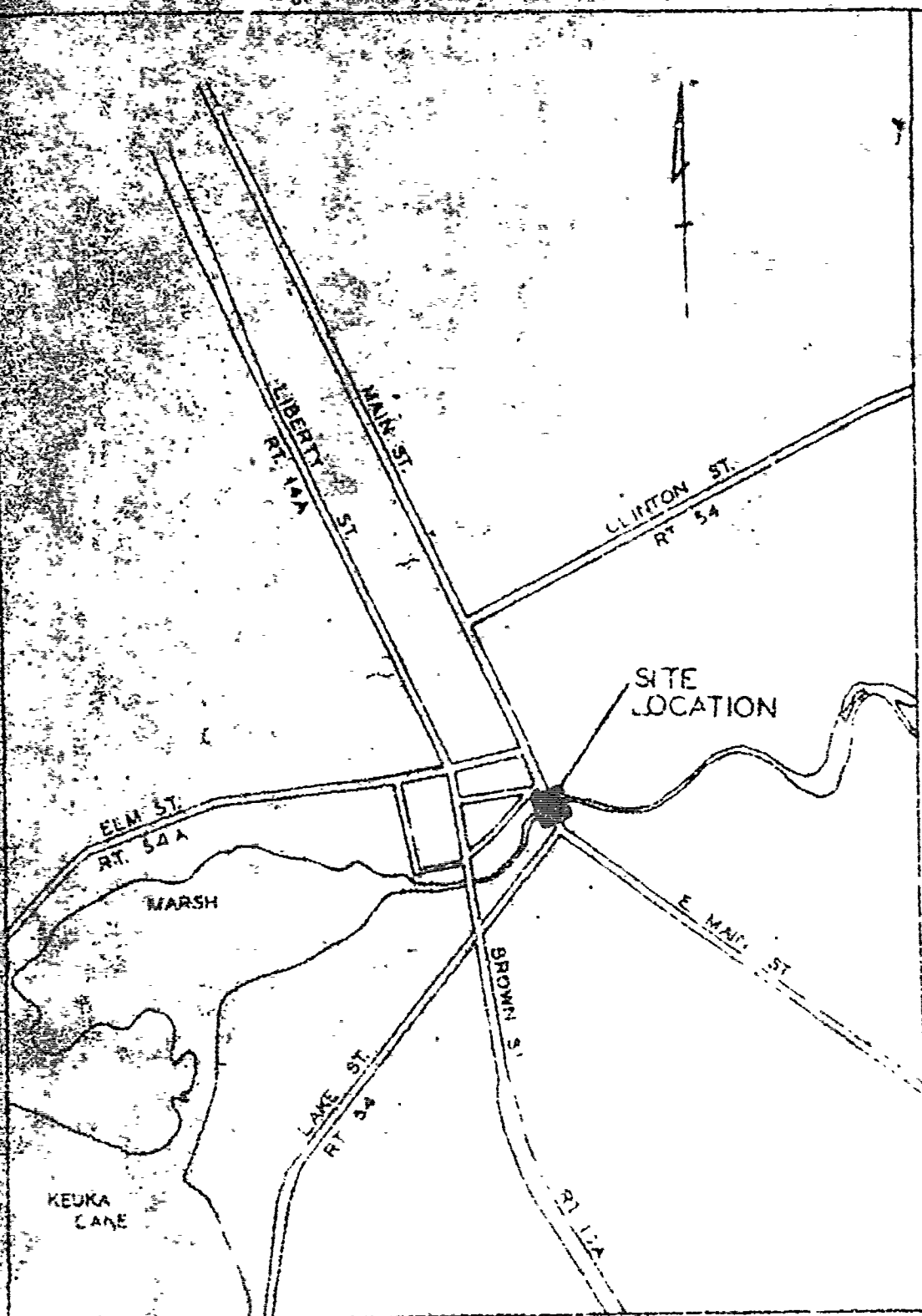
NO. 390
OSWEGO

LOCATION PLAN
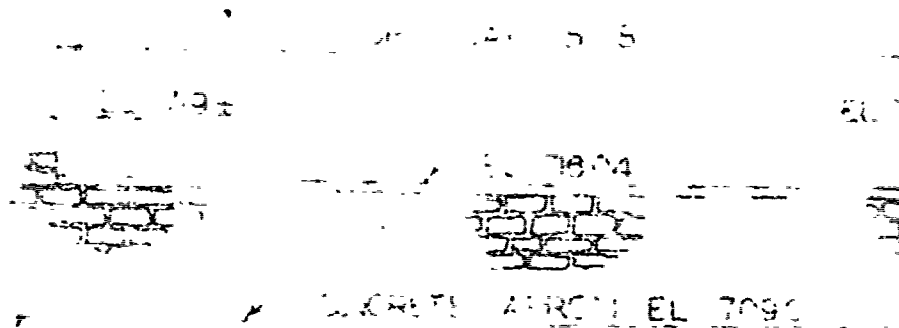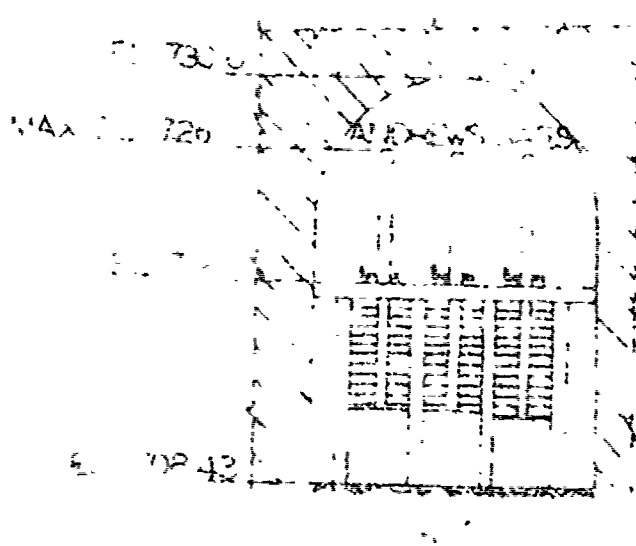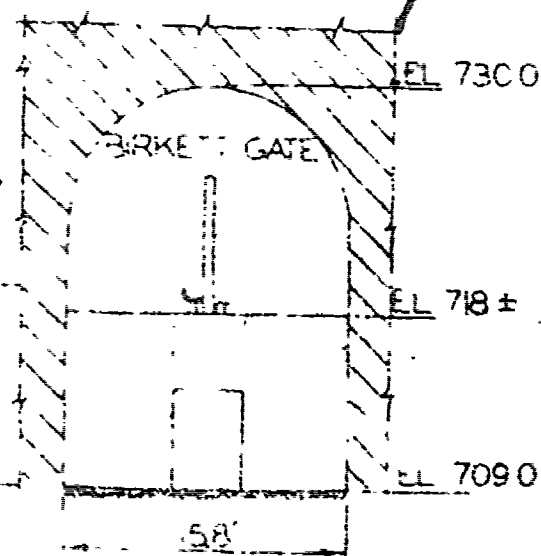
SECTION A-A
SCALE

STill

EL 730 0

BIRKETT GATE

EL 718 ±

EL 709 0

58'

718.04

9

PRC   EL

IN

A A

TOP WALL
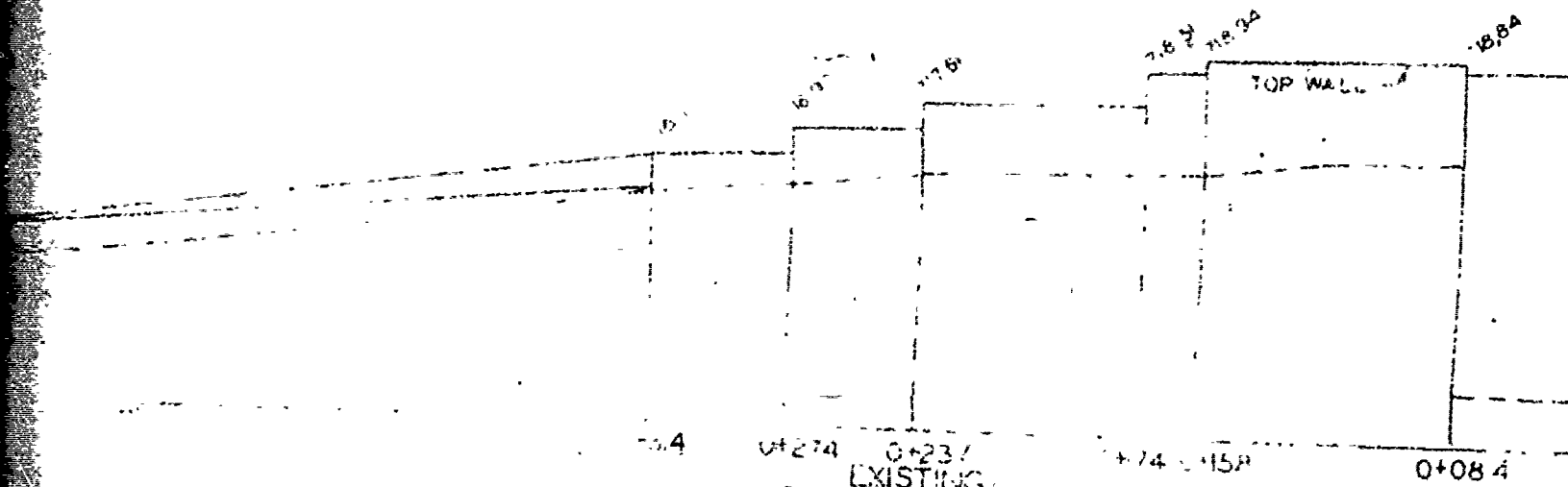
EXISTING
SECTION B-B
SCALE 1=5

0+274   0+237

0+08.4

TOP WALL
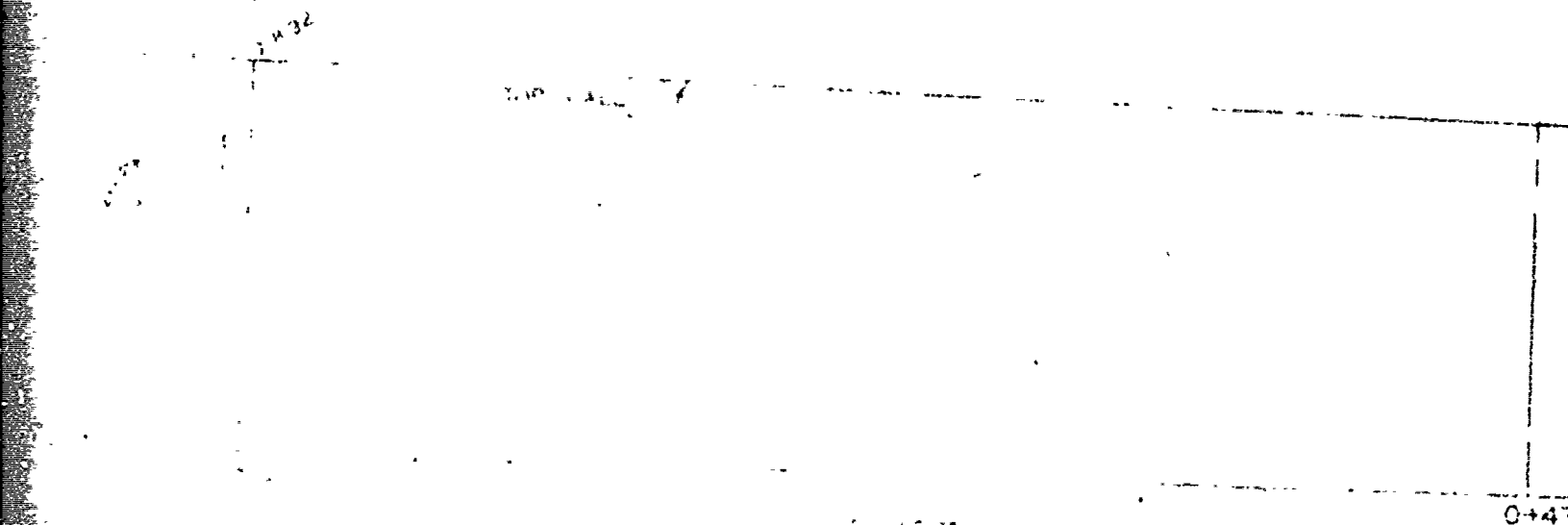
EXISTING
SECTION C-C
SCALE 1=5
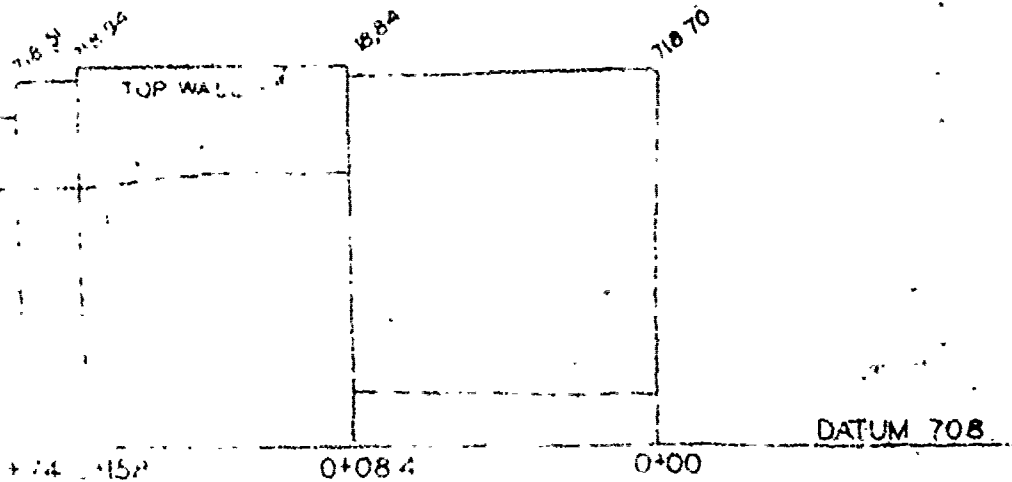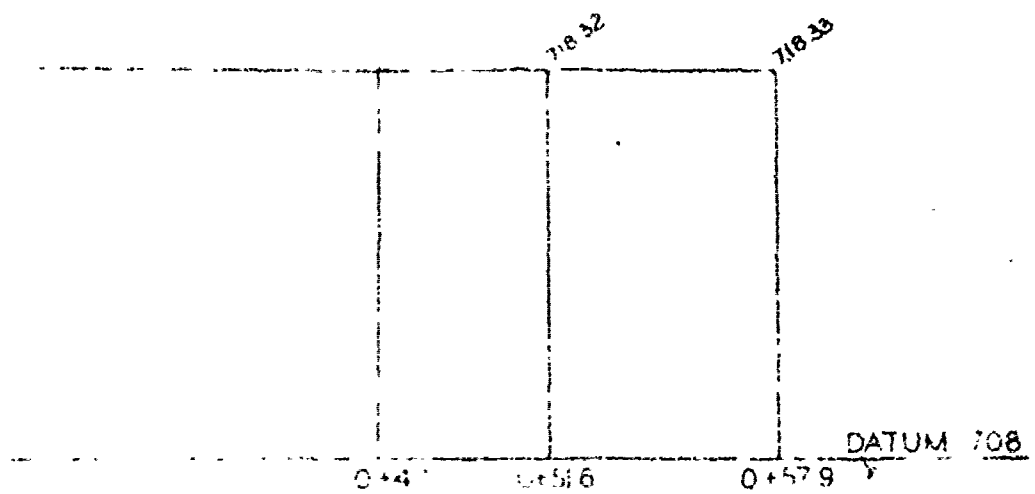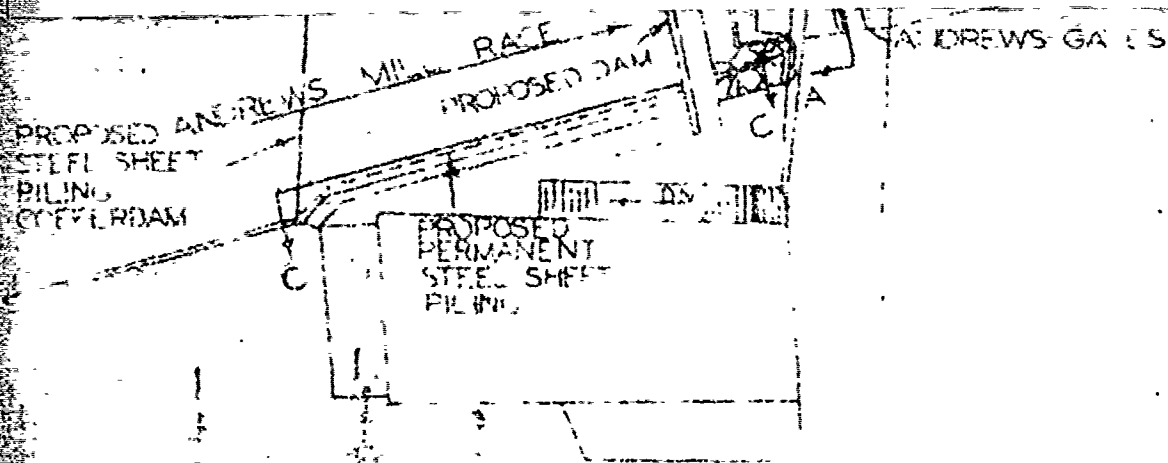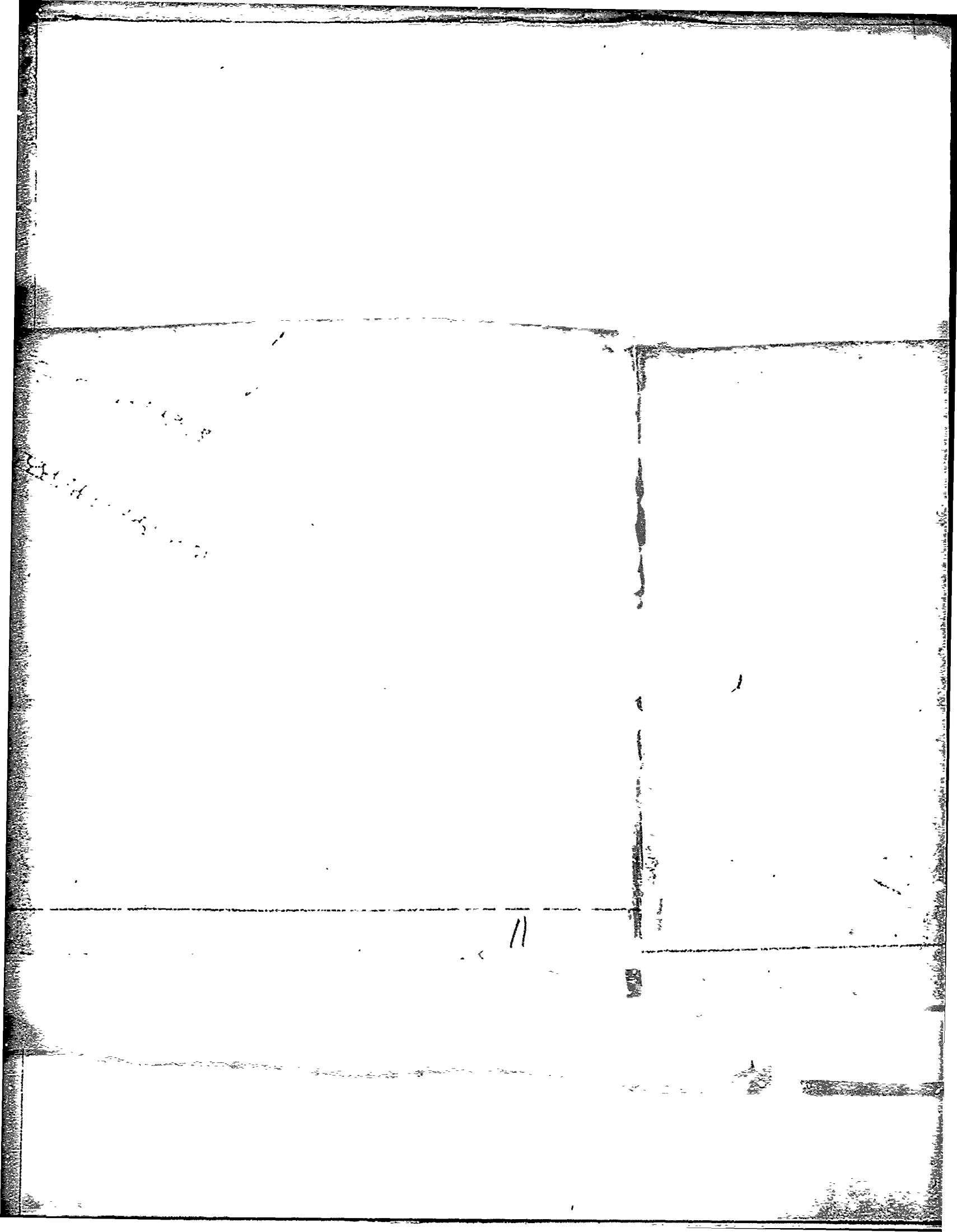
0+47

9

TOP WALL

718.4 718.94 18.84 718.70

DATUM 708

+74 +157 0+084 0+00

237
TING
ON B-B
E 1=5

718.32 718.33

DATUM 708

0+4 0+516 0+579

S
ON C-C
ALE 1=5

PROPOSED ANDREWS MILL RACE

PROPOSED DAM

ANDREWS GATES

PROPOSED ANDREWS
STEEL SHEET
PILING
COFFERDAM

C

A

C

PROPOSED
PERMANENT
STEEL SHEET
PILING

PLAN
SCALE 1"=20'

N

13

DATUM 708

C+4   1+5!6   0+57.9

TNY
C -
E -5

PLAN FOR THE
RECONSTRUCTION OF GATES AND STRUCTURES
ON THE SOUTH BRANCH OF KEUKA LAKE OUTLET
AT MAIN STREET BRIDGE IN
PENN YAN, NEW YORK
SCALE   AS SHOWN— SHEET 1 OF 2
NOVEMBER 18, 1965   REVISED NOV, 22, 1965

Owen C. _____ N.Y.S LIC. P.E. & L.S. 9603

NY-390
OSWEGO

/3